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A demonstration of interfaces between automated deployment systems

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THESIS

A DEMONSTRATION OF INTERFACES
BETWEEN AUTOMATED DEPLOYMENT SYSTEMS

by

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and

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March 1985

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M.G. Sovereign

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This thesis is intended to demonstrate the technological feasibility of interfacing numerous automated information systems throughout the joint deployment community. Through the use of the EDI concept, deployment information can be transferred between commands which must interact in order to efficiently and effectively plan, execute, and coordinate deployment efforts. Implementation of the EDI concept will tie together systems

throughout the community in support of the Joint Operation Planning and Execution System (JOPES). The Electronic Data Interchange is a transaction set oriented interchange which provides the means for efficient data communications.

A Demonstration of Interfaces Between Automated Deployment Systems

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ABSTRACT

This thesis is intended to demonstrate the technological feasibility of interfacing numerous automated information systems throughout the joint deployment community. Through the use of the EDI concept, deployment information can be transferred between commands which must interact in order to efficiently and effectively plan, execute, and coordinate deployment efforts. The Electronic Data Interchange is a transaction set oriented interchange which provides the means for efficient data communication. Implementation of the EDI concept will tie together systems throughout the community in support of the Jcint Operation Planning and Execution System (JOPES).

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I. INTRODUCTION

The joint deployment community is dependent upon electronic exchange of data for successful operations. Current systems do not provide the necessary commands the ability to communicate quickly and efficiently, causing information exchange delays and erroneous or out-of-date data to be transmitted. Both planning and execution phases of deployment operations are adversely affected.

The Electronic Data Interchange (EDI) concept has been proposed as a system for realizing a distributed database approach to information management, the approach required by the Joint Operation Planning and Execution System (JOPES). The EDI concept provides a means for electronic interface among commands which do not have the same hardware, software, or database management systems. While there are many factors to be considered when implementing a community-wide system, and not all concerns or issues can be addressed by any one system, perhaps one of the most basic issues is the feasibility of implementing an exchange system such as the EDI system.

This thesis demonstrates the feasibility of implementing the EDI concept throughout the joint deployment community. It also describes the connection between service unique systems and the system supporting the joint deployment system.

Chapter II provides background by defining the Joint Deployment System. Its current planning and execution systems are outlined. The EDI concept is then examined, and its applicability to the present system is described. Chapter III examines the EDI concept in depth. The mechanics of the system are explained, and a generic

description of how such an interface is accomplished is given. Chapter IV contains a description of the scenario and data elements used to demonstrate the proposed interchange system, and the results of the demonstration. Chapter V is a discussion of current service unique systems which exist at different levels through the joint deployment community. These service unique systems are examined with respect to their interface, both current and potential, with the joint deployment system. Limitations of the EDI concept are also explored. Chapter VI discusses factors which must be considered when implementing this system. Implementation benefits which can be realized through the use of the EDI concept are then summarized.

II. BACKGROUND

The Joint Deployment system (JDS) "consists of personnel, procedures, directives, communication systems, and electronic data processing systems to directly support time-sensitive planning and execution and to complement peacetime deliberate planning." [Ref. 1] The community which is directly concerned with the JDS ranges from organizations at the NCA level down to the actual deployable fighting units. The amount of information exchange necessary to provide all concerned with appropriate, timely, and accurate information is staggering.

A. PLANNING

There are two distinctly separate types of planning within the JDS. The Crisis Action System (CAS) is concerned with planning under time-sensitive or crisis situations. Deliberate planning is planning during peacetime, non-crisis operations. Planning for joint military operations and force deployment is conducted using the Joint Operations Planning System (JOPS). JOPS consists of policies, procedures, and systems used to support force deployment planning. The ADP portion of JOPS operates on the Worldwide Military Command and Control System (WWMCCS) computer system. [Ref. 2].

1. Deliberate Planning

There are five phases to deliberate planning: initiation, concept development, plan development, plan review, and supporting plans. These phases are depicted in Figure 2.1 [Ref. 3: p. 5]. The first two phases are

concerned with defining the threat and establishing an appropriate concept of operations. The third phase, plan development, has as its objective a "transportation feasible, implementable plan." During Phase IV, plan review, the plan is revised, taking into account adequacy, feasibility, suitability, and the dynamics of change. An approved plan is ultimately produced. Phase V produces a family of supporting plans, taking into consideration service doctrine and support agreements.

The primary document associated with deliberate planning which outlines deployment requirements is the time-phased force deployment data (TPFDD). This is created during the Plan Development phase, and at this stage contains the information, on a notional basis, needed to describe a deployment.

The Transportation Operating Agencies (TOAs) are responsible for preparing movement schedules which support requirements established by the TPFDD. In order to accomplish this, the TPFDD goes through an extensive refinement process, with actual forces identified to replace the notional forces. Additionally, specific transportation requirements and unique deployment situations are identified. The execution feasibility of identified scheduled movements is tested by the appropriate TOAs, using service unique systems and software. The TPFDD and the associated OPLAN are eventually reviewed and approved by the JCS, and the TPFDD is then entered into the deployment data base at the Joint Deployment Agency (JDA). When completed, the TPFDD contains time-phased force data, non-unit-related cargo and personnel data, and transportation data for the operation plan, including supporting units with associated priorities, routing of forces to be deployed, associated mobility data, and cargo and personnel movements to be conducted concurrently with the deployment of forces.

PHASE I Initiation	Basis:	National Security Objectives
	Criteria:	The Threat Planning Tasks and Forces
	Objective:	To Set the Stage
PHASE II Concept Definition	Basis:	Mission Assignment (Forecast Assignment
	Criteria:	Force and Resource Allocation All Significant Factors Concept Adequacy
	Objective:	Derive the Concept of Operations
PHASE III Plan Development	Basis:	The Commander's Concept
	Criteria:	Force and Resource Allocation Service Planning Factors Strategic Movement Data
	Objective:	A Transportation Feasible Implementable Plan
PHASE IV Plan Review	Basis:	The Plan
	Criteria:	Adequacy and Feasibility The Dynamics of Change
	Objective:	An Approved Plan
PHASE V Supporting Plans	Basis:	The Approved Plan
	Criteria:	Service Doctrine Support Agreements
	Objective:	A Family of Plans

Figure 2.1 Phases of Deliberate Planning

[Ref. 4] This refined TPFDD is accessible to the deployment community and can be updated, to some extent, by the TOAs as required. Continual interaction between JDA and the TOAs, as well as interaction between two or more TOAs, is necessary for the successful refinement of the TPFDD. Various stages of refinement require interaction at conferences, via telephone, and via computer systems which support the JDS. Once the TPFDD is established, interaction is primarily through the computer systems. Efficient, accurate interaction is necessary for the deployment data base to accurately reflect troop/supply movement, as well as changing requirements or force assignments.

2. Crisis Action Planning

The Crisis Action System provides a framework within which time-sensitive planning can be accomplished. The procedures are intended to provide each level of command the information necessary to develop timely recommendations to aid the NCA in making decisions involving U.S. military forces in the execution of military courses of action. [Ref. 5: p. II-1]

There are six phases to the crisis action system, which are outlined in Figure 2.2. Both the TOAs and JDA are involved immediately in any crisis action planning. During Phase I, the joint deployment community monitors the situation, as JDA ensures that the joint deployment system is operational. During Phase II, as existing OPLANs are being assessed at the NCA level, the crisis action teams at the TOAs and JDA are activated and plans are assessed at that level as well. Coordination between the CINCs involved and the joint deployment community also takes place. During Phase III coordination between the CINCs, the TOAs and JDA increases, as the TOAs prepare preliminary deployment estimates based on commanders' estimates. JDA is also involved

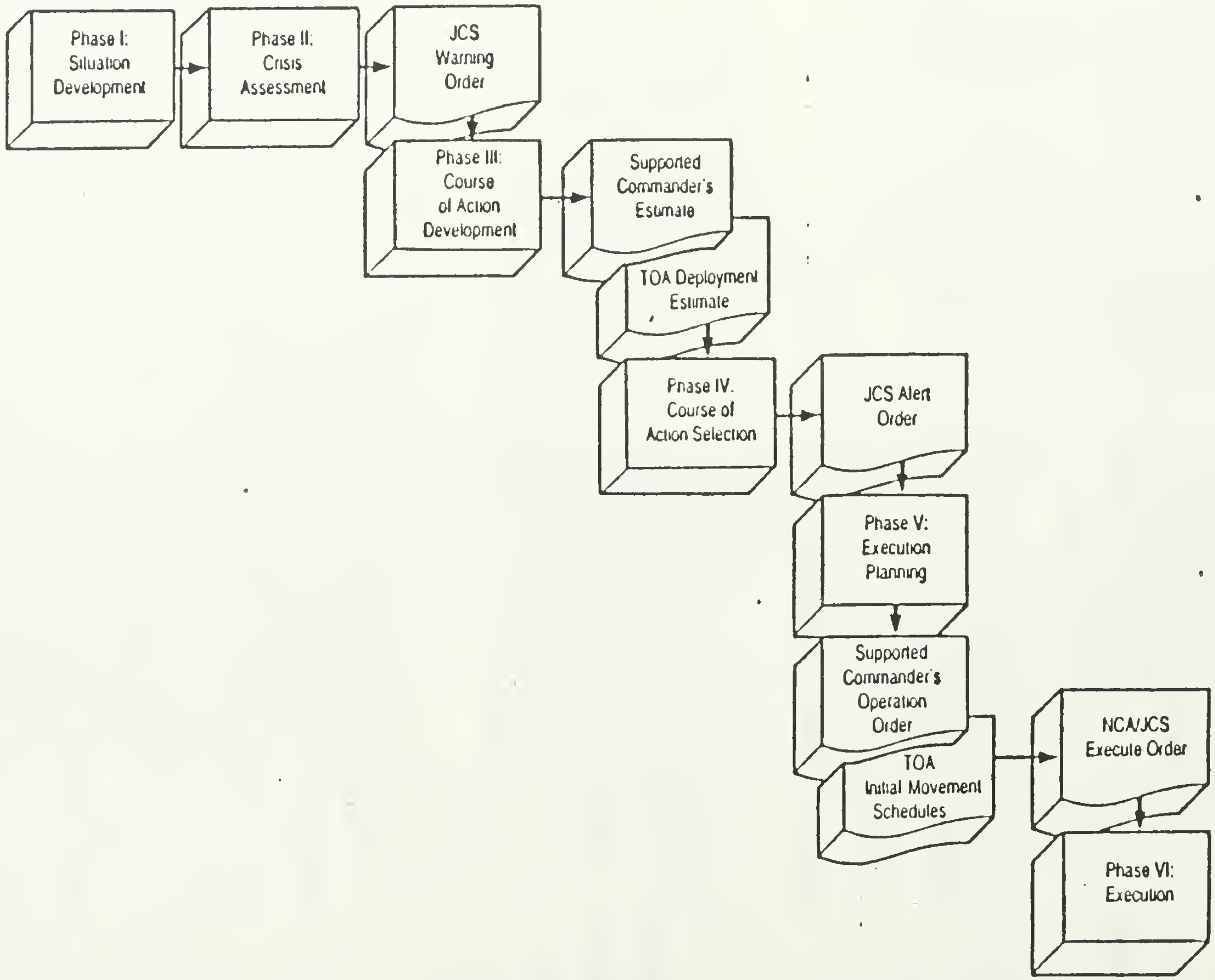


Figure 2.2 Phases of the Crisis Action System

with coordinating the estimates from the TOAs and providing both JCS and CINCs with the consolidated estimates. Throughout the execution phases the TOAs and JDA continue to update and coordinate the force deployment data base as actual movements are initiated and completed, and as requirements change during the conflict. [Ref. 5: pp. II-2 - II-9]

During Phase V the TOAs begin actual scheduling, concentrating on the first six days for air and the first 30 days for sea transportation. JDA verifies the accuracy of the data base before the TOAs begin their scheduling, and resolves transportation problems between TOAs, supporting and supported commanders. During Phase VI the TOAs and JDA continue to manage and coordinate transportation requirements, respond to changes, report deployment deviations and diversions in JDS, and provide deployment status to those concerned, from the TOA level to the JCS.

3. Joint Operation Planning and Execution System (JOPES)

The Joint Operation Planning and Execution System (JOPES) concept was approved in July 1983, and was envisioned as:

> the foundation for our conventional command and control system. JOPES will support monitoring of readiness, and monitoring, planning, and execution of mobilization, deployment, employment, and sustainment activities both in peacetime and under crisis and wartime conditions. [Ref. 6: p. 1]

JOPES came into being primarily because of the extensive redundancy of JOPS and JDS. Although they are two separate systems, the functions and products of each are so entertwined that neither system functions efficiently without considerable interaction with the other. Although not yet

fully operational, JOPES will consist "...of the policy, procedures, software, hardware, personnel, training, and connectivity necessary to facilitate planning, directing, coordinating, monitoring and controlling military operations." [Ref. 7] The effective implementation of such a system will require a distributed data base structure within the WWMCCS community.

B. SERVICE UNIQUE AUTOMATED SYSTEMS

There are numerous automated systems throughout the services which are related, in varying degrees, to the deployment community as a whole, and to the joint deployment system. Figure 2.3 lists some of these systems, and indicates their interrelationships. It should be obvious that an interface between key systems involving data required to effectively plan and execute force deployment would greatly enhance the effectiveness and efficiency of such operations. Although not as clearly indicated in Figure 2.3, interfaces between differing commands using the same systems frequently either are not fully automated, or have inherent serious time delays which create data mismatches and inaccuracies.

The automated systems throughout the joint deployment arena are constantly changing and growing to meet the needs of the community. Many of the problems identified two and three years ago have been partially or completely solved since then. There are still, however, significant problems concerning the implementation of required interfaces. As service-unique systems proliferate, interface requirements become both more numerous, and easier to accomplish. For example, as a system which automates unit requirements data comes on-line, it creates a need for an interface which can provide that data, in required format, for use by transportation agencies within the deployment community. While this

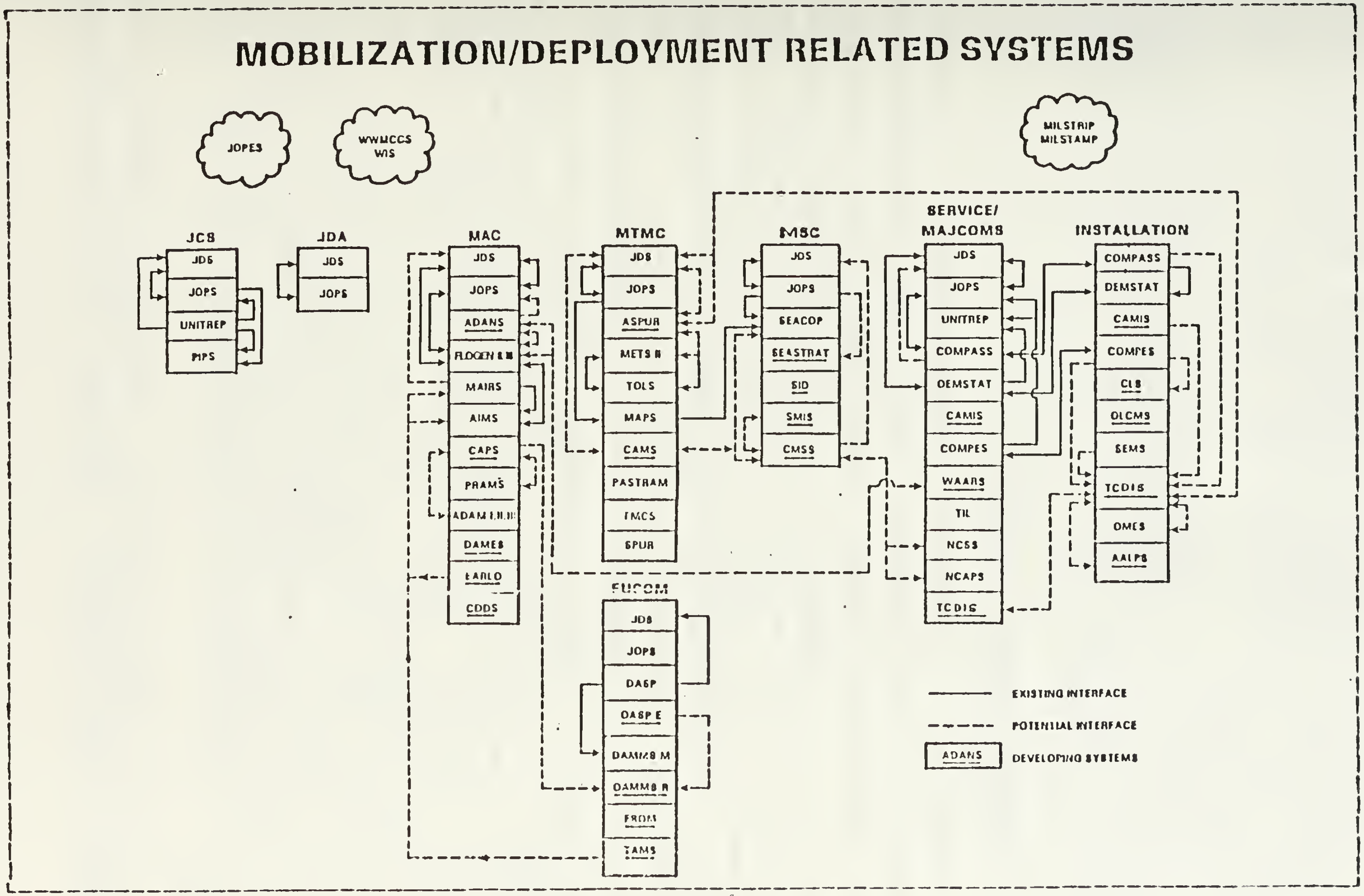


Figure 2.3 Mobilization/Deployment Automated Systems

creates a need for an interface, it also simplifies the problem of data exchange, as automated interfaces are faster and easier than providing that same data manually from the original data location to the IOAs for input in the joint deployment system.

The necessity for interfaces between appropriate systems (and appropriate commands within the same system) is widely recognized. Implementation on a significant basis, however, has not been accomplished.

C. EXISTING INTERFACE METHODS

There are a variety of methods currently in use for accomplishing data transfers. For those organizations not in the WWMCCS Intercomputer Network (WIN), there are essentially two means available for transmitting information between physically separate locations. As antiquated as it may seem, one primary method is the use of the U.S. Postal Service. In numerous instances, actual output listings from the different systems are mailed to the units, the units make pen and ink changes as the status of forces and equipment changes, then the listings are mailed back to the computer site for update to the actual file. In the interim, continuous telephone communication between the parties involved helps keep the files from becoming uselessly out of date.

In other cases, the existing AUTODIN is used to provide either tape-to-tape or card-to-card transfer of data. In either instance, when AUTODIN is used there is a considerable human interface required which not only slows the transfer process but always introduces an unnecessary error factor.

A third, significantly more efficient, method of data transfer in use today is the WIN. For those locations

having access to WIN the human interface is minimized. WIN not only allows for automatic tape-to-tape transfers but also provides a means of computer-to-computer disk transfer. Disk-to-disk transfers are considerably faster and more efficient than tape-to-tape. This is primarily due to the sequential nature of a tape transfer. When automatically sending data over communications lines, there is always the danger of a break in communications service, a 'timeout period'. Under the present WIN system, once a tape transfer is interrupted, for whatever reason, it is physically impossible to restart the tape at some point in the middle. This means that the sending tape is rewound and the entire tape retransmitted. Tape-to-tape transfers are an all too common occurrence in interfacing the systems within the WWMCCS today. Although WIN disk-to-disk transfers are considerably more efficient, the present need for standardization of both the software and hardware required to accomplish the exchange introduces another more complicated issue.

D. STANDARDIZATION

One of the methods suggested to accomplish the necessary interchange of information is community-wide standardization. This method has traditionally been used in the computer industry, for several reasons. Initially, this was the only alternative available; technology was not readily available which would permit any meaningful communication between different vendors' equipment. It was only with the advent of numerous companies and systems and the resulting profusion of previously incompatible equipment that efforts were made to develop methods of computer-to-computer communications.

The first generation of interfaces required a considerable amount of standardization. Programs which translated

from one system to a totally different system were designed primarily as one-time conversion opportunities. Whether for technological or commercial reasons, standardization was considered necessary.

The next stage in the evolution of computer communications involves interfaces that eliminate the need for standardization. These are, however, relatively new, and are not as well known or understood as standardization. Perhaps because of this, the standardization solution to the data exchange problem throughout the joint deployment community, as well as elsewhere, has been proposed by many concerned with the issue. Certainly standardization of data elements and format (and possible hardware as well) would provide the opportunity for automated data exchange. Unfortunately, there are also significant drawbacks to standardization. The most obvious may be that the joint deployment community already abounds with quite a variety of "non-standard" hardware and software. The conversion in equipment costs alone becomes impractical. Equally as important, however, is one of the underlying reasons for the existence of the differing software and hardware: differing applications needs.

The commands within the joint deployment community are responsible for different missions, and their daily requirements emphasize different aspects of the deployment picture. The same transaction (e.g., shipment of tanks from Ft. Ord, California to Misawa, Japan) is of differing importance to different levels in the joint deployment community (the initiating unit, the Transportation Operating Agency involved, the unit assigned to carry the tanks, and the Joint Deployment Agency). The importance of individual data elements involved in this transaction vary from command to command. Additionally, each command involved has other reporting requirements within its own service which require data in certain format. To require identical data element

formats and transmission structures at each node of this transportation operation would introduce inefficiencies on the local level. That is, data elements either not necessary or formatted differently at a local level may, for the "good" of the community, become leading data items which must be formatted and/or transmitted differently. A further complication can be illustrated when items as simple as a shipping date are standardized. Different commands may organize filing or retrieval systems by day or month; requiring every command in the joint deployment system to place the day first introduces unnecessary confusion at those locations where other daily tasks require the month first.

E. ELECTRONIC DATA INTERCHANGE CONCEPT

Electronic Data Interchange (EDI) is a computer-to-computer data exchange system designed to be used by both industry and government. The EDI system objective is to develop and maintain standards for the electronic interchange of data between any type or size of companies or government agencies. These standards were developed in a joint industry/government program sponsored by the United States Department of Transportation. In order to accommodate the requirements of the majority of potential users, the Transportation Data Coordinating Committee (TDCC) was assigned the task of establishing and maintaining the standards. TDCC in 1985, recognizing that potential applications of EDI systems were not limited to the transportation industry, changed their name to EDI Association. The first set of EDI standards, published in 1975, coordinated the requirements of ocean, air, motor, and rail carriers. In addition, these same standards were designed to meet the needs of the users of the carrier services. Subsequent

enhancements have been made to the EDI standards in response to requests from the user community.

The EDI software uses a 'table-driven' technique to generalize processing regardless of the application being processed. Specific directions are taken by the software depending on the data being processed and the particular tables associated with the applications. The EDI software resides in each participants' computer system and is an interface between EDI format structures and the participant's internal system. The EDI software assumes that an EDI participant already has an automated system in use for processing internal applications. Some of these internal applications require data from external (outside the participant's system) sources or provide data to external points. The format for these interagency data transfers is given in the EDI standards. EDI is not an independent system but is meant to interface existing in-house systems. TDCC EDI software eases the transition from a completely closed internal system to an internal system with a controlled external interface. [Ref. 8]

EDI, Incorporated is a company independent of the TDCC with a staff which works as systems consultants to TDCC and has comprehensive and detailed knowledge of the EDI standards and the TDCC software. EDI, INC. has performed a significant role in the industry-wide acceptance of the EDI standards as a viable means of data interchange. This company, under contract, designed the software to link users in the grocery industry, the transportation industry, and is currently under contract with the Military Sealift Command and the Military Traffic Management Command.

The emphasis of the EDI concept is on the exchange of information between computers through the use of standard transaction sets. This provides one of the major benefits of such a system: the users preserve their autonomy while

efficiently interfacing with cther users. There is no requirement for different users to use the same hardware, software, or even data base management systems. This also provides the additional benefit of being able to add or delete individual data elements without requiring software logic changes. [Ref. 7: p. 42]

The EDI interface creates a data exchange structure in the format depicted in Figure 2.4. With this structure modifications to one user's applications do not affect other users. The interface software is between the individual user and the standard data set. Once all nodes of the structure can interface with the standard, data exchange can be accomplished between any twc nodes, with no additional interface requirements necessary for communication between the two nodes. The interface acts as a transparent partner; from the user's viewpoint the ccmmunication is directly with the second user. The overall number of interfaces required for communication between all ncdes is therefore reduced (to four in the example in Figure 2.4 from six if the standard transaction set was not available). [Ref. 7: p. 34]

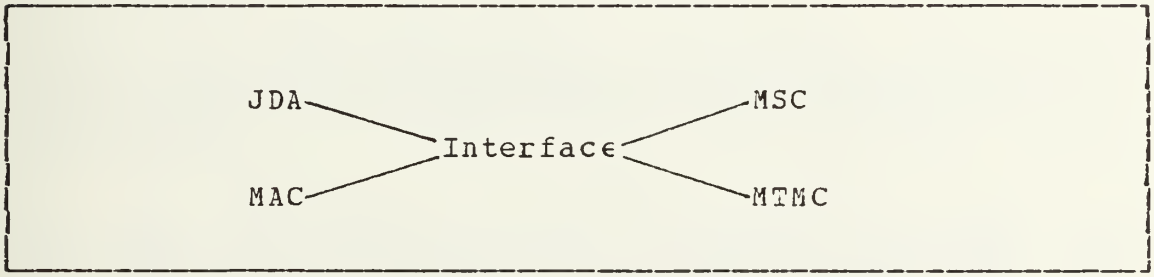


Figure 2.4 Interfacing Through a Standard Data Set

F. SUMMARY

It should be apparent that the flow of information between relevant commands during both deliberate planning and crisis actions must be timely and accurate. The data base required to support such planning and execution must be accessible to all involved, and must be kept current. Thus, effective interchange of information necessitates a network which is, as much as possible, automated, easy to use at each node, and reliable. The EDI concept is one proposal available to accomplish this interchange. The resulting network should encompass service unique automated systems as well as the specific computer system supporting JDS.

III. ELECTRONIC DATA INTERCHANGE

A. INTRODUCTION

Data interchange is concerned with the transmission and interpretation of information among participants. The proposed EDI interface is a computer-to-computer data exchange system which utilizes a disk-to-disk transfer. Its purpose is to simplify the integration of external communications with internal applications programs. The previous chapter introduced the EDI concept; this chapter will describe in some detail the mechanics of the interchange system. Areas of importance include the EDI software and the data and format structures. Definitions of concepts which are integral to an understanding of the following discussion are:

> Interface System: Interface system refers to the computer programs to be used to construct or edit information communicated between electronic data interchange systems and the internal applications programs of a participant.
>
> Electronic Data Interchange: Electronic data interchange means the transmission of transaction data, in formats selected in the EDI standards, between two or more companies or organizations having business relationships.
>
> Internal Applications: Internal applications refers to the use of electronic data processing equipment to support internal operational information functions. The electronic data interchange system interfaces with but does not include internal applications. [Ref. 9]

It must be emphasized that the EDI concept represents an interface between existing internal automated systems and external automated systems. It supplements existing systems in that data transfer and communication are enhanced. The

EDI system does not provide internal data manipulation capabilities, nor will it (of itself) produce such things as reports, data summaries, or OPLANs.

B. EDI SOFTWARE

The EDI software resides in each command's computer system, and provides an interface between that system and EDI format structures. This software extracts data from an internal system's automated data base for transmission to other commands. When receiving data from other commands, the same software puts information into the data base. Objectives for the EDI software are:

To automatically generate and interpret data

To process transaction sets.

To ensure common interpretation of transmission by both the sender and receiver.

To code information when practicable.

To use fixed format standards.

To eliminate data not likely to be used.

To allow for flexibility so that the standards may be enhanced as needs change or evolve. [Ref. 9: pp. 2-3]

1. Software Operation

The key to EDI software operation is its method of transmission. The required data is first transformed into EDI transaction sets, then transmitted in standard, compressed format. Upon receiving a transmission, the software 'explodes' the compressed data into fixed format records defined by the receiving user which are compatible with the user's internal software and database. The order of elements in a given user's record structure does not have to be the same as that used by the EDI software. Software

procedures and interfaces rearrange the data as necessary. The EDI software uses a column of information in one of the EDI tables (Table 4, explained below) in order to 'understand' the locations of given data elements. The interfaces between EDI software and the user's overall system are diagrammed in Figure 3.1 Those modules within the dark box make up the EDI software. [Ref. 9: p. 28].

2. Tables

To facilitate change and modification, the EDI software is 'table-driven'. The tables define formats and edit parameters for use by the program. The five tables used by the EDI software are as follows:

Table 1: Set Pointers
Table 2: Segments for Each Transaction Set
Table 3: Segment Pointers
Table 4: Data Elements for Each Segment
Table 5: Data Elements [Ref. 9: pp. 43-44]

Their functions are described in Figure 3.2 [Ref. 9: p. 35]. The same five tables used for generation of data to be transmitted are used for interpretation of received data. The software programs maintain pointers to the tables. These pointers are moved as necessary during processing in order to edit or generate data formats.

3. Software Programs

There are two EDI operational software programs: Set Generator for transmission and Set Interpreter and Parser for reception. These programs, in addition to maintaining table pointers, use the information at the pointer locations in conjunction with information from the internal data base to assure program operation and interpretation of

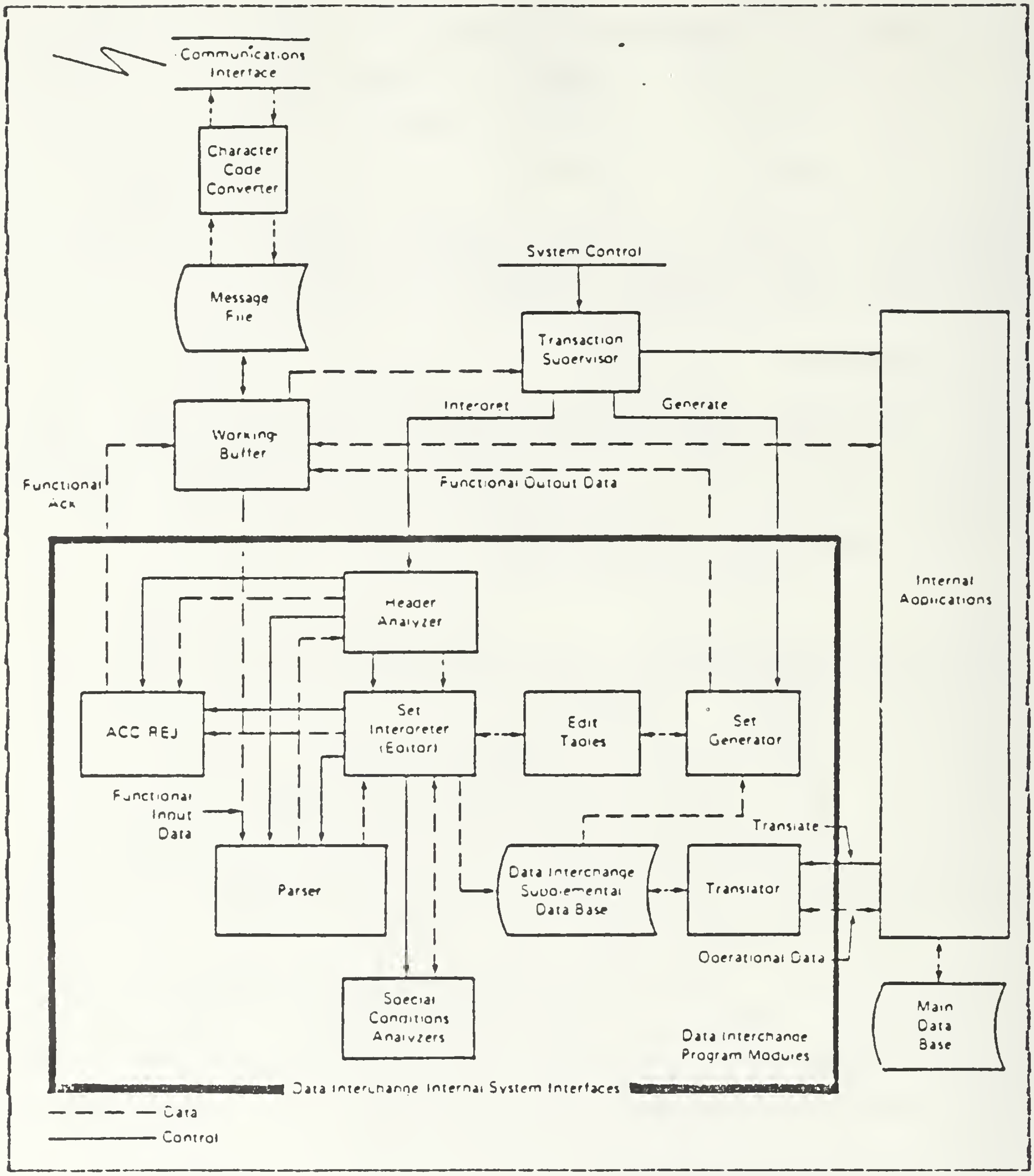


Figure 3.1 Data Interchange Program Modules

data. The Set Generator, using the above information, composes transaction sets in proper transmission structure. The Parser extracts data elements from the continuous stream

Table 1 is used to locate items in Table 2.
Table 2 gives the order of segments in a transaction set for each application.
Table 3 is used to locate items in Table 4.
Table 4 gives the order of data elements in each segment. Table 4 example (simplified):

Segment I.D.	Data Element	Location
.		
.		
.		
EX (Example)	D	11
EX	A	1
EX	E	13
EX	C	9
.		
.		
.		

Table 5 specifies data element attributes.
Table 5 example (simplified):

Data Element	Maximum Length
A	4
B	4
C	2
D	2
E	12
F	8
.	
.	
.	

Figure 3.2 The Five EDI Tables

of characters received, and forwards the data to the Set Interpreter. The Set Interpreter edits incoming transaction sets. The resulting data is passed to the internal applications routine.

C. EDI DATA AND FORMAT STRUCTURE

1. Data Dictionary

All EDI system transaction segments and transaction sets are constructed from basic building blocks which are contained in the Data Dictionary. Within this 'dictionary', all data elements are defined in a standardized format. This does not indicate a need for standardization among commands, however. The internal systems used by commands will interface with this 'centralized' standard through the interchange. The data dictionary includes the following:

- Data Element Number
- Data Element Name
- Data Element Description
- Field Length
- Characteristics
- Reference Designators [Ref. 10: p. 153]

Appendix A is an example of part of a data element dictionary. The first five items above are self-explanatory; the reference designators refer to the transaction sets in which the particular element is used.

2. Units of Information

There are three basic units of information used in the EDI data interchange. These units may be of variable length and relate to each other as shown in Figure 3.3 [Ref. 10: p. 5].

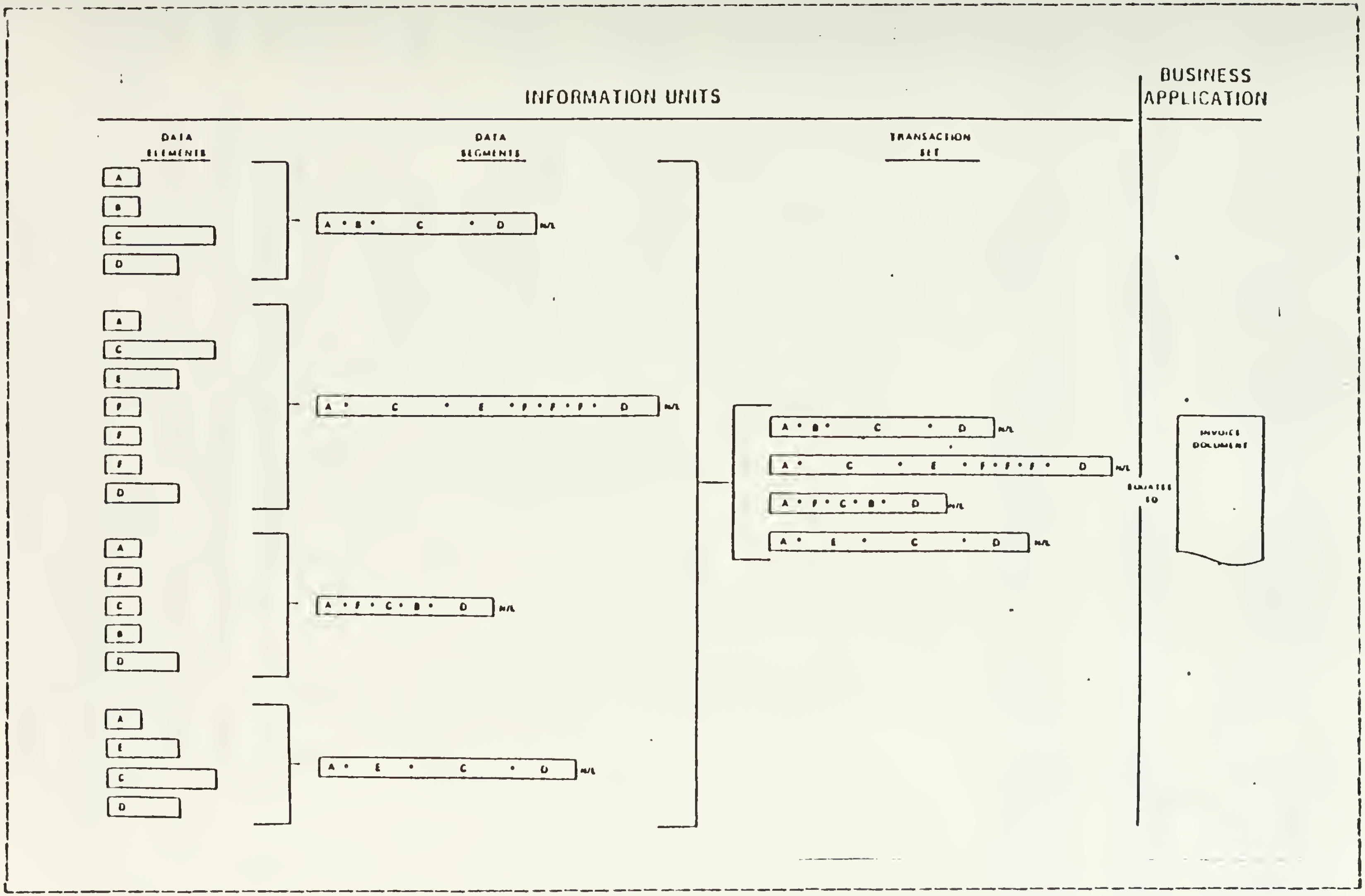


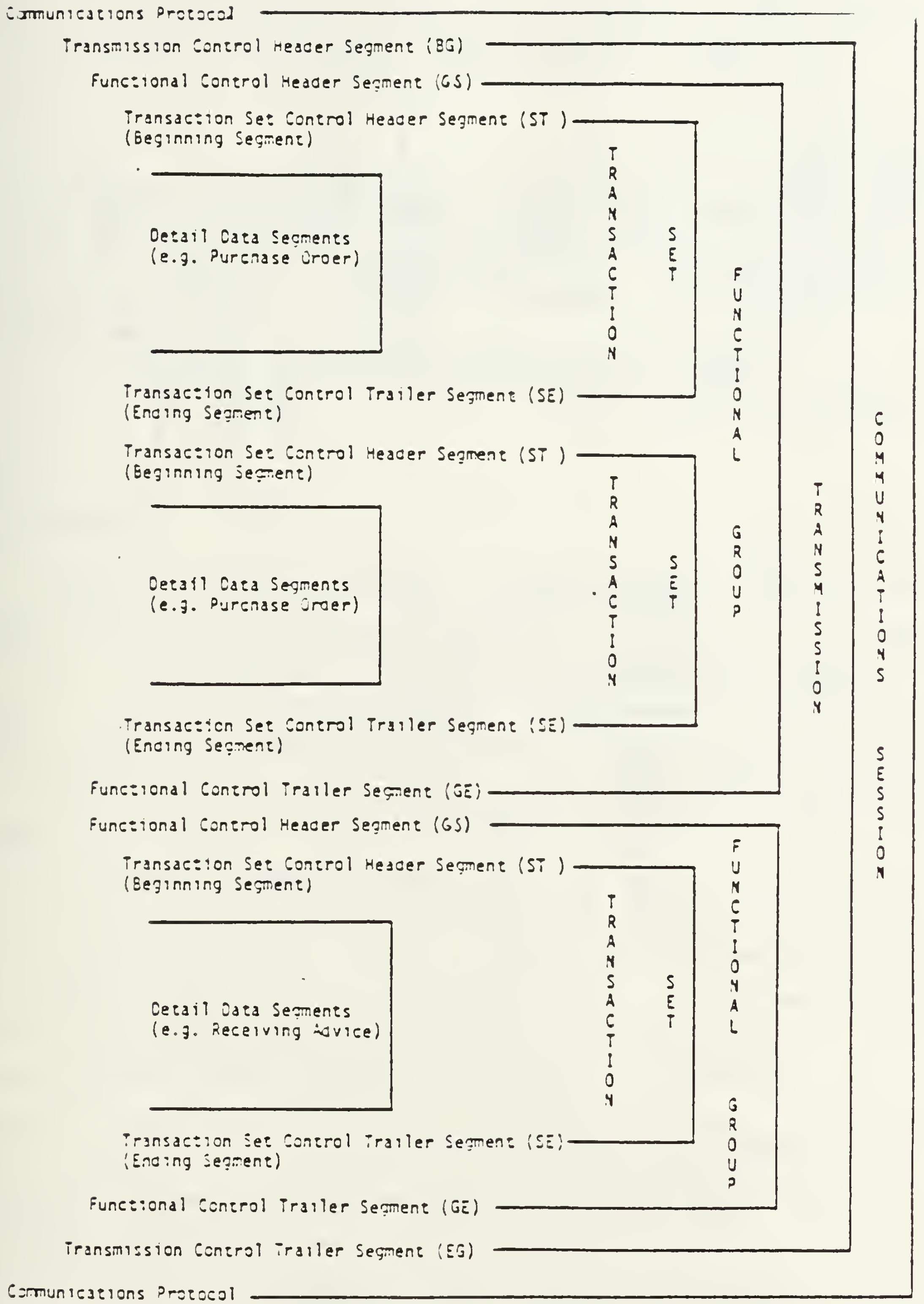
Figure 3.3 EDI Information Units

They are defined as fcllows:

> Data Element: The smallest information unit in the EDI information structure is the data element. A data element may be a single character code, a series of characters constituting a literal description or a numeric quantity.
>
> Data Segment: A data segment is composed of a function identifier and one or more functionally related data elements positioned serially in a standard manner.
>
> Transaction Set: A transaction set is that group of standard data segments, in a predefined sequence, needed to provide all of the data required to define a complete transaction such as purchase order, invoice, bill of lading, or freight bill. [Ref. 9: pp. 4-6]

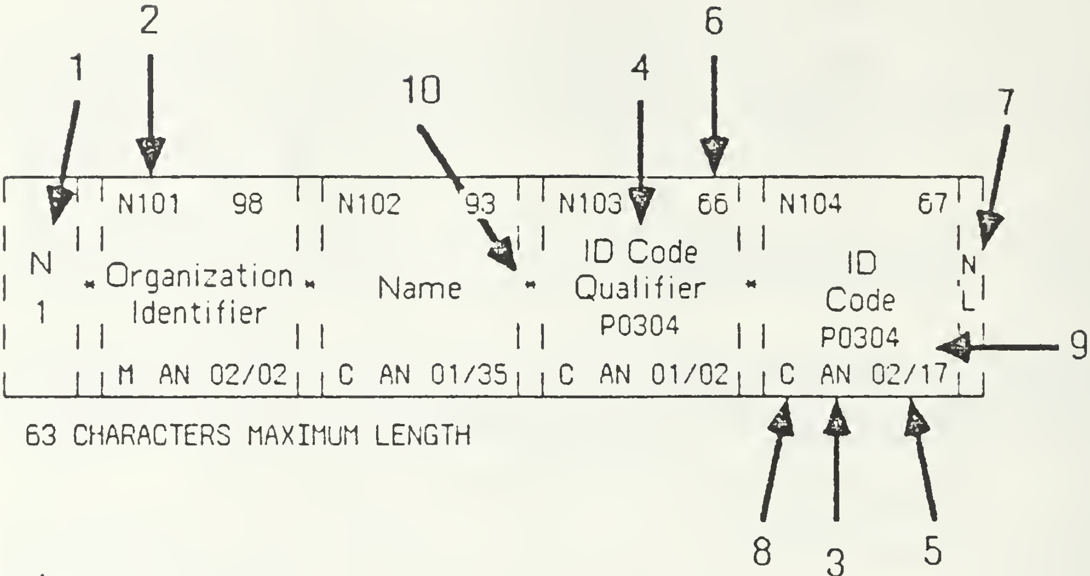
Additionally, transaction sets are grouped into functional groups, which are combined for transmissions. Appropriate segments are inserted throughout these levels in order to ensure communication coherency. These additional units are called format units and are lccated at the beginning and ending of segments, as shown in Figure 3.4 [Ref. 9: p. 7] Except where noted, these segments are required. Although not pictured, there are alsc format units at the data segment and data element levels.

Each data segment begins with a unique 'data segment identifier' and ends with a 'data segment terminator'. The first is composed of alpha/numeric characters, while the latter is either an EBCDIC ccde or ASCII code character [Ref. 9: p. 6]. At the data element level the format unit is known as a 'data element delimiter', and is represented by an "*". It follows each data element in a segment except the last (it also fcllows the segment identifier). The asterisk is also transmitted whenever there is no data being transmitted for a defined element other than the last element in a segment. This preserves the data element count. The information required to completely describe a data segment is depicted in Figure 3.5.



NOTE: The Transmission Control Header and Transmission Trailer are not used in all communications.

Figure 3.4 Transmission Structure



1 – Set Identifier
2 – Reference designator: Segment identifier followed by sequence number within segment
3 – (A) Alpha; (N) Numeric; (AN) Alpha/Numeric; (Dn) Implied Decimal (with n places to right of implied decimal point), (R) Decimal (with decimal point explicitly required), (NZ) Numeric–zero
4 – Data element name
5 – Minimum/maximum number of characters
6 – Data element reference number
7 – New line character or carriage return, line feed
8 – (M) Mandatory; (C) Conditional; (O) Optional
9 – Special relational conditions
10 – Delimiter

Figure 3.5 Transaction Segment Format

3. Communications Interface

The EDI software utilizes 512 character blocks. Existing communications may utilize blocks of other lengths. There is no need to change either the EDI software or the length required for the communications protocol. The

communications software used should adapt to both lengths, as indicated in Figure 3.6 [Ref. 9: pp. 42, 44].

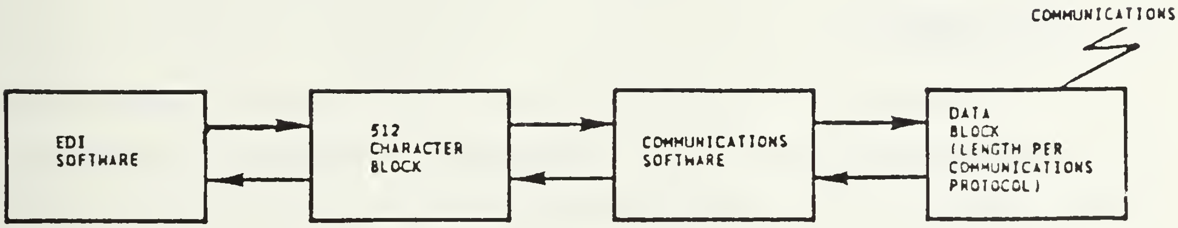


Figure 3.6 Communications Interface

D. SUMMARY

The EDI concept provides an interchange between automated systems internal and external to a command or organization. The software resides within a command's system, and uses a table-driven technique to allow for generalized processing, regardless of the application being processed. It is generic in that no specific hardware or software is required, and in fact many different vendors may be used with no degradation in system capabilities.

Within the EDI software, data elements, data segments, and transaction sets are used to convert differing formats to standardized format for transmission, and again at the receiving end to reconstitute the transmission into formats acceptable to the receiver. As should be obvious after the generic description of the software mechanics throughout this chapter, this concept is applicable at many different levels throughout the joint deployment community, as well as elsewhere in DOD.

IV. DEMONSTRATION

A. INTRODUCTION

As discussed in Chapter II, the joint operation planning procedure is an ongoing, day-to-day process. Operation Plans (OPLANs) are continuously being developed and revised to ensure there is an OPLAN designed to meet any anticipated contingency. An integral part of every OPLAN is identification of those military units required to implement the given plan. Once specific units are identified, the Joint Deployment System comes into play in determining the transportation assets needed to deploy those units to the operating location. This process is also an ongoing, continuous procedure. As OPLANs are revised, the transportation needs may change; as units acquire new equipment or modify the old, their transportation needs, again, may change.

In order to ensure that the transportation assets are available to fulfill the requirements of any OPLAN, the Joint Deployment Agency, as part of the JDS, maintains a central data base containing all of the specific information regarding the deployment needs of every military unit. This is necessarily a very large, complex data base and it is easy to visualize the tremendous task involved in keeping the data current and accurate. The specific procedures employed to modify and update this data base vary depending on the unit, the service, and TCA involved in the particular scenario. In any case, the applicability of an automated interface between JDS and the organization involved in the data update process is obvious.

For the purpose of demonstrating the feasibility of using the EDI system of data interchange in the deployment

arena, we developed a scenario involving one unit, one TOA, one command headquarters, and the JDA. It is important to remember that what we are demonstrating is only one very small portion of the overall communications process and data transfer which transpires routinely in maintaining the JDS data base.

In this scenario development, we will first identify the agencies selected to exemplify the 'typical' data flow, then discuss how these agencies are currently accomplishing the task of maintaining the data on a daily basis, and then pose a crisis situation which requires that the actual system be forced into action. Finally, we will show an example of the same automated systems interfaced using EDI as compared with the current procedures.

B. SCENARIO

We selected the Army's Military Traffic Management Command (MTMC) as the TOA involved in the transport of the deploying unit. In particular, we selected the 7th Infantry Division out of Ft. Ord, CA as the unit to be deployed. The geographical location of Ft. Ord requires transport of the unit through MTMC Western Area (MTMCWA) in Oakland, CA. Because we are dealing with an Army unit, the Forces Command (FORSCOM) in Atlanta, GA also becomes a player. And, of course, the goal of our scenario is to show how each of these organizations interfaces with the Joint Deployment Agency and the JDS in Tampa, FL.

Each of the above organizations uses a number of different automated systems for managing their assets. In this demonstration we will deal only with FORSCOM's COMPASS which produces the Automated Unit Equipment List (AUEL), and MTMC's SPUR. The current procedures require the following steps.

- The unit, here 7th Infantry Division, receives a copy of its AUEL from the COMPASS. The Installation Transportation Officer (ITC), or his staff, reviews the AUEL and periodically submits any updated information about 7th ID's equipment tc FORSCOM.
- FORSCOM maintains the accurate status of each unit's equipment. Section D of this chapter contains examples of the types of informaticn maintained in the COMPASS data base.
- FORSCOM creates a tape for transfer to JDS, with the entire description of each unit's equipment.
- JDA updates the Unit Movement Data (UMD) file in JDS from the tape transferred from FORSCOM. Section D contains examples of the types of data in the UMD.
- FORSCOM creates a second tape for transfer to MTMC Headquarters in Washington, D.C. This tape contains the same basic information about unit equipment as that sent to JDA.
- MTMC Headquarters manually extracts classified data from the COMPASS tape and forwards an edited, unclassified version of the tape tc MTMCWA.
- MTMCWA receives the tape from Headquarters and inputs the data into the System for Predetermining Unit Requirements (SPURs). SPURs is the on-line system that is used by the TOAs to schedule and manifest 7th ID on a particular vessel.
- At the time 7th ID is manifested, MTMCWA must interface with JDS to reflect the manifest information in that data base. It is the JDS which will be used by all other participants in the successful deployment of 7th ID. For instance, the Military Airlift Command (MAC) may also provide air assets for equipment and troop deployment.

The major assumption in this process is that all three organizations and their associated data bases; MTMCWA in the SPURs, FORSCOM in the COMPASS, and JDA in the JDS, will all have the <u>exact</u> information regarding 7th ID's equipment and transportation requirements. This assumption personifies the major flaw in the existing system. Because of the human intervention required to extract classified portions of the data and the amount of time involved to accomplish tape to tape transfers, whether using AUTODIN or WIN, there are often significant differences in these three data bases. It is essential that MTMCWA, where the unit is actually manifested, has the most accurate information at all times. It is just as important that JDA, as the coordinator of the overall deployment, not limited to 7th ID, also have the most accurate information.

In an attempt to stay current, the users of the SPURs maintain an off-line, but direct, communication with all of the units under its responsibility. This direct correspondence serves the purpose of data currency but tends to further complicate the situation. Upon receipt of unit data through the COMPASS to SPURs interface, the MTMCWA transportation specialist must ascertain whether this data, or that which he received direct from the unit, is the correct information.

C. INTERACTION DURING CRISIS DEPLOYMENT

In the previous section we discussed the daily interactions between four particular nodes in the overall deployment process. The procedures outlined in Section B are routinely accomplished without the added complications of an actual crisis situation. Obviously, when a crisis does occur, some of these procedures will be eliminated while the time constraint on others will be greatly accelerated. A

simple example of how an actual crisis operation might develop is described below.

- First, we'll assume a crisis situation emerges somewhere in the Pacific Theater. This implies that CINCPAC becomes both the unified and the supported commander. For the purpose of this discussion we will also assume that both MAC and MTMC are involved as TOAs responsible for troop and equipment deployment. However, we will discuss only MTMC's deployment role. It is very important to remember the significant role MAC would also be playing during the overall data exchange process.
- As the crisis develops there is constant communication and coordination throughout the entire military community. CINCPAC submits a Commander's Assessment to the Joint Chiefs of Staff. This report outlines what forces he has readily available, the major constraints to their employment, and his proposed course of action. JCS reviews the situation with the services and TOAs. The NCA is continually kept informed by the JCS and through the WWMCCS communication systems. Throughout this process the JDS data base is accessed to provide the latest information regarding major unit force strengths and their transportation requirements. [Ref. 3: p. 10]
- Eventually, as the situation progresses, JCS issues a Warning Order containing guidance from the NCA pertaining to the crisis. Based on the Warning Order, another round of communications between CINCPAC, the service components, the supporting commanders, and the TOAs transpires. The result of all this effort, with again significant references to the JDS data base for supporting data, is the selection of a specific Course of Action (COA). [Ref. 3: p. 10]

- The JCS recommend this COA to the Secretary of Defense and the President. If the President decides to proceed with the COA involving military forces, the JCS issues an Alert Order to CINCPAC. In response to the Alert Order, the supporting commands and TOAs prepare an Operation Order. The JDA assists this process by:

> "...updating the force list and coordinating the deployment of schedules by the transportation operating agencies. The deployment data base at the Joint Deployment Agency constitutes the authoritative, up-to-date source of force and resupply information. The data base can be queried by the entire deployment community using WIN." [Ref. 3: p. 12]

- Finally, if the President decides to execute the planned operation, the Secretary of Defense, through the JCS issues an Execute Order instructing CINCPAC to execute his Operation Order. This begins the process of deployment execution.

The execution phase of a deployment operation requires constant contact and coordination by all supporting commanders and TOAs, in our case FORSCOM and MTMC. In actuality, the 7th Infantry Division would have been identified as a proposed supporting unit during the process of selecting the appropriate course of action. With even the possibility of using 7th ID, FORSCOM would have notified that commander, requested updated AUEL information and forwarded the current status of 7th ID troops and equipment, along with their transportation requirements, to the JDS. All of the information must be available prior to the actual COA selection.

Once 7th ID is officially notified of the order to deploy, the transportation process is activated. MTMCWA begins arrangements for ship movement of heavy equipment to the nearest port to the scene of the crisis. In this instance, 7th ID departs from Oakland, CA, the Port of

Embarkation (POE) and will be shipped to a Port of Debarkation (POD) somewhere in the Pacific.

The actual manifest on the ship is accomplished item by item as the equipment and supplies are loaded. This ensures an accurate account of the exact load being transported. This exact manifest information is required for both billing and more importantly, for proper identification at the receiving POD. The manifest information is then entered into the JDS data base by plans personnel on site at MTMCWA in Oakland. It is obvious that these individuals must have the correct data pertaining to 7th ID's deployment to the POD.

This marks the beginning of many problems which arise as a result of the data transfer procedures discussed in Section B. The exact manifest information is known, at this point in time, only by those individuals responsible for the actual manifest activity. However, when this data is loaded into the JDS data base, the JDS system often rejects the entry. In fact, whenever manifest data differs in any way from the planned equipment load reflected in the Unit Movement Data (UMD) file maintained in JDS, an entry error is created. This data rejection causes a significant time lag in the effectiveness of the overall deployment process.

D. DEMONSTRATION

The problems arising under the current data transfer procedures can be significantly reduced through the application of the EDI concept. The use of EDI for one of the data transfers described in section B above is demonstrated below.

Figure 4.1 is a copy of the data format for the COMPASS Automated Unit Equipment File (AUEL). Figure 4.2 is a copy of the data format for the Unit Movement Data (UMD) file in

JDS. Appendix B is the EDI transaction set which would be used to transfer data from one system to the other. The data elements which are required for transfer between the two systems are indicated by the alphabetic characters to the left of the data element name in Figures 4.1 and 4.2 The same letters (i.e., a, b, c, etc.) are used to indicate the same item of data within each file. It should be noted that the same data items are often in different locations and use differing field lengths in each system.

Tracing a single data element through the transmission process should illustrate the operation of the EDI method. Figure 4.3 contains one item of information, as shown in the AUEL record format and the Automated Unit Equipment Listing. The equivalent data element in EDI format is also shown, as is that item positioned in the EDI transmission format. The JDS UMD record format for the same item is also shown. These have been extracted from the complete document examples, as shown in Figure 4.1, Appendix C, Appendix B, Figure 4.4, and Figure 4.2, respectively.

The item labeled (a) in the record formats for AUEL and JDS is equivalent to one EDI element, element #111. For this example, it is the first element in Data Segment D1, which is part of Transaction Set #365. (See Figure 3.3 for the relationship between elements, segments, and sets. See also Appendix B.)

The arrows in Figure 4.3 indicate the conversion flow for this item. Through the use of the EDI tables (see Figure 3.2) residing in the EDI conversion software, the information in positions 1-6 of field 1 in the AUEL detail record is put in EDI format. This element, Unit Identification Code (WHGHAA for this example), which is mandatory, alpha/numeric, and six characters (see Figure 3.5 for location of this information) is placed in the appropriate location in the data segment. Upon receipt, the

RECORD SPECIFICATION

ID: AUEL-Detail   TITLE: AUEL Cargo Detail Record

DESCRIPTION: Contains information to identify and describe cargo shipment units applicable to unit moves.

CLASSIFICATION: UNCLASSIFIED   LENGTH: 105

	POSITION	FIELD	FIELD TITLES	REP	LGTH	REMARKS
(a)	1-6	1	Unit Identification Code (UIC)	A/N	6	Control Field
(b)	7	2	Type Unit Movement Data (TYPEDATA)	A/N	1	Control Field
	8-13	3	Shipment Unit Number (SHIPUNR)	A/N	6	Control Field
	14	4	Load Number (LOADNR)	A/N	1	Control Field Value is "b" or numeric
	15-20	5	Line Item Number (LIN)	A/N	6	
	21-22	6	LIN Index Number (LININDXNR)	N	2	
(j)	23-43	7	Item Description (nomenclature) (ITEMDESC)	A/N	21	
	44-55	8	Model Number (MODELNR)	A/N	12	
	56-60	9	Water Commodity Code (WCCMMCD)	A/N	5	
	61-62	10	Type Packing (TYPEPACK)	A	2	
(e)	63-66	11	Item Length Rounded (ITEMLGTHRND)	N	4	Rounded to nearest inch
(f)	67-70	12	Item Width Rounded (ITEMWDTHRND)	N	4	Rounded to nearest inch
(g)	71-74	13	Item Height Rounded (ITEMHGTHRND)	N	4	Rounded to nearest inch
(h)	75-81	14	Gross Weight Pounds (GRWTLBS)	N	7	
(i)	82-88	15	Item Cubic Feet Rounded (ITEMCUFTRND)	N	7	
	89	16	Mode to POE (MODETOPOE)	A	1	
(c)	90-92	17	Cargo Category Code (CGOCATCDE)	A/N	3	
(d)	93	18	Heavy Lift Code (HVYLFT)	A/N	1	
	94-105	20	Filler	A/N	12	

Figure 4.1 Automated Unit Equipment File Format

```
                 TRANS-UMD-DATA (COMPASS FILE DATA)

01  TRANS-UMD-DATA.
    02  TRANS-UMD-HDR.
        05  FILLER                                  PIC X(5).
        05  TRANS-UMD-AREA                          PIC 99 VALUE 99.
        05  TRANS-UMD-FUNCTION                      PIC X.
            88  TRANS-UMD-ADD                       VALUE "A".
            88  TRANS-UMD-CHG                       VALUE "C".
            88  TRANS-UMD-DEL                       VALUE "D".
        05  TRANS-UMD-OCCURS                        PIC 99 VALUE 14.
        05  TRANS-UMD-LENGTH                        PIC 9(4) VALUE 102.
        05  FILLER                                  PIC X.
        05  TRANS-UMD-SVC-CODE                      PIC X.
        05  TRANS-UMD-PROVORG                       PIC X.
        05  TRANS-UMD-ROUTE-LINK                    PIC X(6).
        05  TRANS-UMD-ROUTE-IND                     PIC X
        05  TRANS-UMD-ROUTE-MAP                     PIC X(6)
    02  TRANS-UMD.
(a)     05  TRANS-UMD-UIC                           PIC X(6).
        05  TRANS-UMD-MOVEMENT-GRP.
(c)         10  TRANS-UMD-CARGO-CAT                 PIC X(3).
(d)         10  TRANS-UMD-HEAVY-LIFT                PIC X.
        05  TRANS-UMD-REC-TYPE                      PIC X.
        05  FILLER                                  PIC X(8).
(b)     05  TRANS-UMD-TYPE-DATA                     PIC X.
        05  TRANS-UMD-REC-CLASS                     PIC X.
        05  TRANS-UMD-REC-INDICATOR                 PIC X.
```

Figure 4.2   Joint Deployment System UMD File Format

```
        05  TRANS-UMD-REC-CREATED                      PIC 9(6).
        05  TRANS-UMD-REC-LAST-CHG                     PIC 9(6).
    02  TRANS-LEVEL-1.
        05  TRANS-UMD-NBR-CARGO-CATS                   PIC 9(3).
        05  TRANS-UMD-TOT-STONS-BU                     PIC 9(6)V9.
        05  TRANS-UMD-TOT-MTONS-BU                     PIC 9(7).
        05  TRANS-UMD-TOT-STONS-OVR                    PIC 9(6)V9.
        05  TRANS-UMD-TOT-MTONS-OVR                    PIC 9(7).
        05  TRANS-UMD-TOT-STONS-OUT                    PIC 9(6)V9.
        05  TRANS-UMD-TOT-MTONS-OUT                    PIC 9(7).
        05  TRANS-UMD-TOT-STONS-NAT                    PIC 9(6)V9.
        05  TRANS-UMD-TOT-MTONS-NAT                    PIC 9(7).
        05  TRANS-UMD-BULK-POL                         PIC 9(7).
        05  FILLER                                     PIC X(2).
    02  TRANS-UMD-LEVEL-2 REDEFINES TRANS-UMD-LEVEL-1.
        05  TRANS-UMD-CARGO-CAT-SUM-SQFT               PIC 9(6).
        05  TRANS-UMD-CARGO-CAT-SUM-STONS              PIC 9(5)V9.
        05  TRANS-UMD-CARGO-CAT-SUM-MTONS              PIC 9(6).
        05  FILLER                                     PIC X(50).
    02  TRANS-UMD-LEVEL-3 REDEFINES TRANS-UMD-LEVEL-1.
        05  FILLER                                     PIC X(14).
        05  TRANS-UMD-QUANTITY                         PIC 9(3).
   (j)  05  TRANS-UMD-CARGO-DESCRIPTION                PIC X(14).
   (e)  05  TRANS-UMD-CARGO-LENGTH                     PIC 9(4).
   (f)  05  TRANS-UMD-CARGO-WIDTH                      PIC 9(3).
   (g)  05  TRANS-UMD-CARGO-HEIGHT                     PIC 9(3).
        05  TRANS-UMD-CARGO-SQFT                       PIC 9(4).
   (h)  05  TRANS-UMD-CARGO-STONS                      PIC 9(5)V9.
   (i)  05  TRANS-UMD-CARGO-MTONS                      PIC 9(6).
        05  FILLER                                     PIC X(21).
```

Figure 4.2 Joint Deployment System UMD File Format (cont'd)

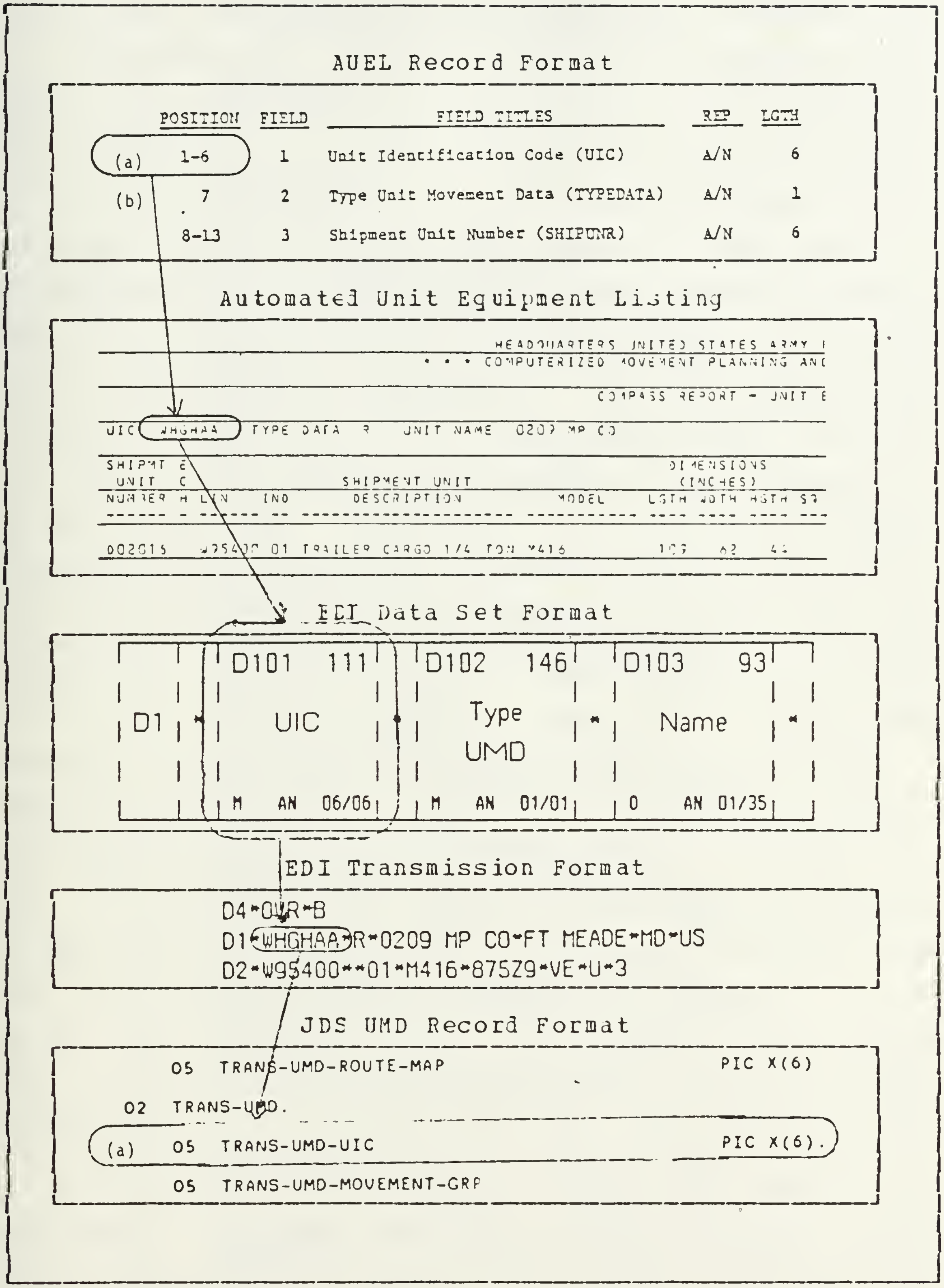


Figure 4.3 Conversion Flow of a Single Data Item

EDI software at the receiving site transforms this element (again, through the use of the tables) into JDS format, as determined by JDS record format requirements. It is then available for inclusion in JDS reports or for visual recall as part of any one of a number of information screens on the system terminals at JDA.

This same conversion flow occurs for each piece of information which must be transmitted. It is especially important to note the number and size of those data items found in the AUEL file but not used in the UMD file. Under the current system this information is automatically transferred to JDA and stripped from the file after receipt of the entire file. Using the EDI method, only those data elements actually used are transferred. This can be seen in Figure 4.4, which shows the data after it has been converted into EDI standard data elements and data segments for transmission. All other fields can be transferred using one or more of the optional data segments, but only when deemed appropriate by the sender.

Appendix C contains examples of the types of data maintained in COMPASS and transferred to JDS. The data in these listings is currently transferred in the record format shown in Figure 4.1 Examination of these listings shows the considerable duplication of data being transmitted. The same essential information, in a considerably more compact form, is transmitted using EDI Transaction Set 365, Unit Movement Data (Appendix B). This transaction set, while demonstrating the basic format of transaction sets, also lists the associated data segments which would be required for this specific application. Appendix A is a section of a Data Element Dictionary, which includes a partial list of the data elements used in these data segments. Comparison between present formats and the EDI transmission set (Figure 4.4 shows that considerable reduction in transmitted information can be realized using EDI.

TRANSACTION SET - #365 UNIT MOVEMENT DATA

```
(BG SEGMENT)
(GS SEGMENT)
.
.
ST*365*TRANS0001
BGF*FI*F1203
N1*FW*USARMY FORSCOM*5*COMPASS
N2*US ARMY FORCES COMMAND HEADQUARTERS
N1*TO*JOINT DEPLOYMENT AGENCY*5*JDS/UMO
D1*GHICKL*0*0051 AD BN 91 BTY A VULC*FT ORD*CA*US
D2*X60833**02*M151A2*87SZ9*VO*U*7
D3*TRUCK UTILITY 1/4 TON*132*64*53*N*2450*L*256*E
D4*OVR*B
D2*W95400**01*M416*87SZ9*VE*U*7
D3*TRAILER CARGO 1/4 TON*132*64*53*N*2450*L*256*E
D4*OVR*A
D2*X39940**02*M5161 WWN*87SZ9*VO*U*2
D3*TRUCK CARGO 1-1/4 TON*231*85*72*N*7480*L*820*E
D4*OVR*K
D2*J96845**02*M167*87SZ9*VE*U*1
D3*GUN AA TOWED 20MM*158*78*66*N*3260*L*467*E
D4*OVR*B
D1*WHGHAA*R*0209 MP CO*FT MEADE*MD*US
D2*W95400**01*M416*87SZ9*VE*U*3
D3*TRAILER CARGO 1/4 TON*109*62*44*N*580*L*170*E
D4*OVR*A
D2*W95400(A)**01***MX*U*3
D3*LOAD-MISC TOE ORG EQUIP*****500*L*30*E
D2*X40009**02*M35A2*87SZ9*VO*U*1
D3*TRUCK CARGO 2-1/2 TON*265*95*88*N*13180*L*1292**
D4*OVR*S
D2*X40009(A)**02***MX*U*1
D3*LOAD-MISC TOE ORG EQUIP*****4820*L*270*E
D2*X40146**02*M35A2 WWN*87SZ9*VO*U*1
D3*TRUCK CARGO 2-1/2 TON*279*95*88*N*13570*L*1359*E
D4*OVR*S
D2*X40146(A)**02***MX*U*1
D3*LOAD-MISC TOE ORG EQUIP*****4820*L*270*E
D2*W95811**02*M105A2*87SZ9*VE*U*2
D3*TRAILER CARGO 1-1/2 T*166*83*82*N*2570*L*654*E
D4*OVR*B
D2*W95811(A)**02***MX*U*2
D3*LOAD-MISC TOE ORG EQUIP*****2930*L*200*E
.
.
K4*COMMENTS
SE*38*TRANS0001
.
.
(GE SEGMENT)
(EG SEGMENT)
```

Figure 4.4 Transmission of Data Set #365 in EDI Format

E. EDI ADVANTAGES

The data elements, segments, and sets utilized in the EDI concept are designed to be applicable to a wide variety of applications. Through the use of the table-driven system, command unique forms can be translated into generic data elements, and combined into transaction sets which can be transmitted to many other organizations. Because the receiving organizations' EDI software will translate the transmitted elements into locally desired formats, the same transmission could actually result in reports in vastly different formats at multiple locations. This highlights one of the major benefits of the EDI procedures: standard formats are not required for effective community-wide data transfers.

As shown above, the problems arising under the current data transfer procedures are primarily the result of inefficient use of existing communications assets. As previously discussed the current system requires transfer of the entire COMPASS file, including data elements not required for use in JDS. This file is then interpreted at JDA, the necessary data is extracted from the COMPASS file and inserted in the proper format into the UMD file in the JDS data base. The actual file transfer is accomplished as a tape-to-tape transfer using the File Transfer Service (FTS) of the WIN.

The basic nature of a tape-to-tape transfer automatically makes this a relatively slow, inefficient process. In a rather volatile network, subject to frequent, if minor, interruptions in communications service, this often necessitates numerous retransfers of previously delivered data in an effort to ensure accuracy of the total file. In this demonstration, we propose a disk-to-disk transfer in order to eliminate the need to retransmit the entire file if the transfer is interrupted by a communications break. This

alone will significantly reduce the time lag between the locations involved, and thus increase the probability that the data will agree at both sites.

An even more effective difference between the current transfer method and the EDI method demonstrated here is in the vastly reduced amount of data required to be sent. The EDI method, as shown in Figure 4.4, requires that only those data elements actually used at the receiving site be transferred. The determination of required elements is made through the table-driven operations. Data elements not required are listed as optional in the data segments. In fact, in some cases the data segments are optional, depending upon to which site(s) the transaction set is transferred. By eliminating unnecessary data from the transaction set, the sender can ensure the most efficient use of the computer systems and the communications network. In this example, a reduction of approximately 50% in transmitted data would be realized.

F. SUMMARY

Within the joint deployment community, extensive data transfers are necessary for planning and execution of deployment efforts. In a scenario involving MTMCWA, 7th Infantry Division, FORSCOM, and JDA, data transfers such as the one demonstrated would be required. The current transfers utilize tape-to-tape transfers and transmit entire reports, including redundant information, and information utilized at the originating end but not the receiving end. Data transfers to satisfy the same scenario requirements, but utilizing the EDI method, provide several benefits. Conversion to multiple formats for multiple receivers is not necessary. Disk-to-disk transfers reduce the necessity for retransmission in case of interrupted transmission.

Additionally, the reduced amount of data transmitted decreases the burden cn communications assets.

V. INTERFACE APPLICATIONS

A. INTRODUCTION

The previous chapters have established the necessity for an efficient electronic data interchange, and have demonstrated the technical feasibility of the EDI concept as just such an exchange.

> Deployment management systems (personnel, hardware, communications equipment, software, procedures) must collectively support the deployment process from the National Command Authorities (NCA) level to the installation level using fully integrated concepts which maximize our deployment capabilities and provide necessary surge capacity to meet time-sensitive crisis and wartime requirements. [Ref. 11: p. 14]

Joint planning experiences and exercises have shown the need for better coordination and understanding of the myriad mobilization and deployment information systems which either currently exist or have been conceptually determined. [Ref. 2] A brief discussion of some of these systems should highlight potential applications of an interchange such as the EDI concept.

B. INTEGRATED NETWORKS

1. TC ACCIS

One significant advancement toward the implementation of an automated interface is the development of the Transportation Coordinator Automated Command and Control Information System (TC ACCIS) prototype. TC ACCIS is a response to lessons learned during JDA directed exercises regarding our ability to deploy forces and sustain materiel and personnel under crisis conditions. The JDA is the Joint

Project Manager of this development effort which is being conducted within the WWMCCS Research and Development program. The TC ACCIS effort will provide an automated unit movements data base at the unit and shipper level, an automated surge capability to the installation transportation coordinator, and an automated interface between the Installation Transportation Office (ITO) and the associated TOA.

2. TC DIS

A planned enhancement to the TC ACCIS prototype, called the Transportation Coordinator and Deployment Information System (TC DIS), includes an interface with major commands in an effort to give them improved visibility over the deployment status of units assigned to them and provides them a capability to influence the situation. In addition, TC DIS provides an interface directly from the unit, where it is generally agreed the most current information is of necessity available, to the JDS.

The TC DIS concept recognizes multicommand, multifunctional interfaces during the deployment management process. Service and command systems which already exist can be complemented by automation through electronic interfaces. Existing systems are generally stand-alone functional systems. Some use notional data as their basis for initial planning. Aging can occur because data maintainers do not always have ready access to the systems for updating. [Ref. 11: p. 32]

C. SERVICE SYSTEMS

Service systems which were created at the MAJCOM level include DEMSTAT, COMPASS, and COMPES. Existing systems at the TOA level which provide networks for reporting vital

movement information from support elements at installations and POEs to the TOAs include SEMS, SPUR, ASPUR, TOLS, METS, and MAIRS. Many of the systems which exist at the MAJCOM level are also located at the installation level. These systems usually have existing interfaces within the overall system between levels, and could potentially be connected under the TC DIS concept. Additionally, there are systems still in development phases which will provide enhancements to the automation of the deplcyment community information requirements.

1. MAJCOM Level Systems

a. DEMSTAT/COMPASS

The Deployment, Employment, Mobilization Status System (DEMSTAT) was developed to provide Forces Command (FORSCOM) with a system which would place in execution those plans developed in planning systems such as JOPS. It is activated during crisis situations, and combines several automated planning systems utilizing ADP resources of WWMCCS. This system is used to identify units for specific operations and to manage those forces during the execution of the operation. When activated, the DEMSTAT database is the "sole source for execution of all mobilization/ deployment/employment operations and the operation's associated requirements." [Ref. 2: p. 34] The database is updated by automated reports from FORSCOM itself, from JDA, and from reporting commands/installations. [Ref. 2: p. 35]

The DEMSTAT system is the execution system which is used in conjunction with the planning system COMPASS. The primary objective of COMPASS is to provide an automated system with unit movement information used in mobilization and deployment planning. Information in COMPASS is used to create the AUEL which provides the unit movement

requirements information to MTMC. These two systems have no real automated interface, although the information in COMPASS is used in DEMSTAT. There is presently an interface between DEMSTAT and JDS, where information is transferred through an existing automated interchange via AUTODIN, although the WIN is not used. DEMSTAT uses fewer fields than JDS, and so when the transfers occur, the fields appropriate to DEMSTAT are stripped from the information transferred by JDS. This interface is representative of the command to command interface as discussed in Chapter II.

b. COMPES

The Contingency Operation/Mobility Planning and Execution System (COMPES), an Air Force standard system, is comprised of three modules: an Operation Plan Module, a Logistics Module, and a Manpower/Personnel Module. This system is implemented at both the MAJCOM and base levels throughout the Air Force. Its functions include logistics planning applications and monitoring the status of deployed units. The Logistics Module in particular was designed to satisfy the needs of both base-level and MAJCOM logistics planners responsible for deployment planning. COMPES' primary benefit is to provide "...a standard Air Force deployment planning system which will minimize training requirements, and provide a standard reference system for intercommand deployment planning." [Ref. 2: p. 23] There are existing interfaces between COMPES at the MAJCOM level and the base level. There are also interfaces between COMPES and JOPS and UNITREP. Those interfaces currently involve data transfer via AUTODIN using tape to tape dump.

2. Installation/TOA Level Systems

a. SEMS

The Marine Corps' Standard Embarkation Management System (SEMS) provides deployment planning documentation and execution planning assistance for amphibious operations worldwide. The information in SEMS includes unit personnel, supply, and equipment information at the squadron and battalion level. Standalone deployable minicomputers are used, with diskettes which can be processed on the Fleet Marine Force (ADPE-FMF) IBM 4110 computer. There are no current interfaces with other deployment systems. However, the SEMS is precisely the type of system which would benefit from an EDI interchange as postulated in the TC DIS concept. [Ref. 2: p. 74]

b. SPUR/ASPUR

The System for Predetermining Unit Requirements (SPUR) is "an initial step towards documentation simplification aimed specifically at unit deployments to overseas locations under emergency conditions." [Ref. 2: p. 77]. SPUR obtains much of its data from the AUEL generated by COMPASS. The information is stored either in magnetic tape files or disk packs. Objectives of SPUR include:

- Eliminate ITO of detailed Routing Requests at deployment
- Eliminate unit submission of Advanced Transportation Control Movement Document (ATCMDs) at deployment time
- Reduce the MILSTAMP document work load at embarkation terminals by preplacement of ATCMDs in the TERMS data base.
- Provide area commands with an automated data base of unit loading information collected in advance. [Ref. 2: p. 77]

There are no current interfaces with other systems. However, SPUR is the foundation for an automated system which is scheduled to become operational in May 1985. This system (Automated Systems for Processing Unit Requirements - ASPUR) will continue to provide the capability to receive and process requirements from the AUEL. One of its proposed primary functions is to receive, process, and store movement requirements from TC ACCIS as well as other sources such as METS, TOLS, and JDS. These data transfers will be accomplished by using a high speed central processor. [Ref. 2: pp. 11-12]

c. MAIRS

The Military Air Integrated Reporting System (MAIRS) provides automated support for the Military Airlift Command (MAC). It provides information such as aircraft movement and delays, passenger and cargo requirement summaries, and movement data to MAC, MAC Numbered Air Forces, and the JCS. There is currently an interface with AIMS, another Air Force automated system. There are no interfaces with other TOA or deployment related systems, although the potential exists for interface with the JDS. A test MAIRS-JDS interface has been proposed, which will forward airlift arrival/departure information to JDS. This interface will utilize AUTODIN. [Ref. 2: pp. 53-54]

D. SUMMARY

Systems which represent significant advancement in the automated interface arena are the TC ACCIS and the TC DIS. The TC DIS is an enhancement to the TC ACCIS, and will provide a direct interface between the unit and JDS. There are a variety of automated systems throughout the joint deployment community, with a wide range of existing

interface capabilities. The potential exists within most of these systems for increased interfaces, as indicated in Figure 2.3. The EDI method of interfacing is ideal for many of these applications. Since each of the systems described above was designed and developed by individuals for the separate services, some of the data descriptions and formats may differ according to the given service requirements. The EDI concept is designed precisely to address these types of issues; therefore, this interchange concept would be appropriate for interfacing systems throughout the community.

VI. IMPLEMENTATION CONSIDERATIONS/RECOMMENDATIONS

A. INTRODUCTION

In order to effectively implement any interface system, the coordination and cooperation of all involved services or agencies is essential. For the purpose of this discussion those involved agencies, termed the Joint Deployment Community (JDC), are collectively referred to as

> Those headquarters, command, and agencies involved in the training, preparation, movement, reception, employment, support, and sustainment of military forces assigned or committed to a theater of operations or objective area. The JDC usually consists of the OJCS, Services, certain service major commands (including the Service wholesale logistic commands), unified and specified commands (and their service component commands), DLA, the TOAs, JDA, joint task forces (as applicable), and other defense agencies (e.g., DIA) as may be appropriate to a given scenario. [Ref. 5: p. x]

It is immediately apparent that when such a large group of diverse organizations must agree on any concept of operations, problems are bound to arise. Therein lies a major obstacle to the acceptance of this proposed interface system.

B. JOINT DEPLOYMENT COMMUNITY REACTIONS

There is almost unanimous agreement throughout the JDC that the need exists for an automated interface between the units, the TOAs, and JDA. Additionally, virtually all agree that state of the art technology is readily available to accomplish the necessary hardware and software connectivity. However, there is widespread disagreement among the various participants regarding the required level of interface, the necessary detail of data exchange, and which particular technical solution to implement.

Analysis of the JDC responses to the proposed TC ACCIS and TC DIS reveals a wide disparity of opinions about the feasibility of both TC ACCIS and the expanded capabilities of TC DIS. Although many representatives throughout the community favor the overall concept of TC ACCIS, there are just as many who disagree with large portions of the plan. Even among its supporters, there are overriding concerns about the ability of the community as a whole to make the system work. Some of the more frequently raised objections are described below.

1. ITO/JDS Interface Necessity

A primary concern is whether or not there is truly a need for direct interface between the automated unit data base and the JDS. Such an interface is proposed in the TC DIS ROC as a one-way link with the JDS having access to unit data but the unit having no need for access to the JDS data base. This is obviously for security purposes, to protect the classified data maintained within JDS. There are a number of objections to this interface:

- One of the basic premises in the TC DIS ROC is that the transfer of unclassified unit information from the installation data base would be in an unclassified mode. The assumption that all unit data is unclassified is not necessarily valid. Certain information about individual units when combined within a particular installation's data base becomes more sensitive.
- In a crisis situation, the supported CINCs obtain necessary information about the current deployment status of required forces and material through the JDS. Much of this information is already available to JDS in other existing systems. The remainder of the required information could be obtained by JDS from the TOA. This is especially true if the proposed installation/TOA interface can be developed.

- There is significant disagreement concerning the level of detailed data actually required within the JDS. The services tend to believe that allowing the JDS a direct interface with the units would increase a perceived tendency on the part of JDA to micro-manage every aspect of deployment.
- There is a major 'turf battle' ensuing between the services and the JDA. The services feel that the JDA has more than overstepped its bounds by even indicating that subordinate organizations should report directly to them without following through normal command channels. None of the services are willing to give up control of their own forces to this extent.

2. <u>System Compatibility</u>

Concern has also been expressed that any new system development must be made compatible with existing service unique systems. There is a feeling among the community that some aspects of TC ACCIS are not adequately considering this compatibility. Additionally, the Joint Reporting Structure (JRS) requirements must be carefully considered to enhance unit reporting and to modernize the JRS. A primary thought here is that TC ACCIS implementation should be carefully monitored to ensure that no additional reporting is required.

3. <u>Communications Capacity</u>

Any new interfaces, regardless of the level, would be heavily dependent on the WWMCCS Intercomputer Network (WIN) for the communications transfer of the actual data. The WIN is already severely taxed to satisfy current operational requirements. Some of the members of the community feel that added interface requirements might over encumber existing WWMCCS facilities.

4. Security

As already alluded to, there is the significant problem of data classification and the security of classified information. It is inevitable that even unclassified data at unit level will ultimately be classified at some higher level as it is incorporated into the JDS. The JDS data base is TOP SECRET. There are many questions regarding the ability to adequately protect potentially classified data in an interface between remotely located computer systems.

5. Modernization Efforts

Finally, all participants in the JDC have expressed interest in the evolution of both the JOPES and the WIS. It is imperative that these proposed interfaces be developed in conjunction with the WWMCCS standard JOPES and WIS efforts.

C. EDI IMPLEMENTATION LIMITATIONS AND DISADVANTAGES

Some of the above issues suggest limitations or disadvantages to implementation of the EDI concept. Some of these are actually 'political' problems as opposed to technical problems, and as such are beyond the scope of this thesis.

Security issues are a combination of political and technical problems. The EDI interface software, consisting of the data elements, segments and sets and the associated tables, do not inherently possess security restrictions. It is assumed that the security issues will be handled by the command's existing computer hardware and software. Determination of access requirements/allowances must be made prior to concept implementation; the potential exists for concept limitations based on security requirements.

The disadvantages associated with implementation of an interface utilizing the EDI concept are primarily initial disadvantages. The most significant effort required would be the programming needed. Each command utilizing the concept will need a program which provides the interface between their current system and the EDI software. While this effort is substantial, it is for the most part a one-time operation. Once the program is running, modifications to incorporate command changes are minor.

Associated with this interface software is also the computer time and space required for its operation. While this differs from system to system and is thus hard to quantify in a general sense, it does reduce computer capacity available for intra-command operations.

Another 'cost' incurred when implementing the EDI concept is the community wide requirement to identify data sets, segments, and elements necessary for the interface. The majority of these items are in existence, as those developed by TDCC are designed to be applicable to a variety of industries. In some cases, additional codes may be required to enable the use of existing data elements. There would probably be more new sets and segments required for application to the joint deployment community. It will require high level support of the EDI concept to ensure timely agreement among the users on the exact makeup of the new sets and segments. In order to assist in both the creation of these items and the software design described above, TDCC offers two-day sessions intended to provide selected individuals the necessary training and information.

Although this training is available, the assistance of a civilian company in the software design will likely be required. There are several companies, primarily in the Washington D.C. area, which can provide this service. Their names may be obtained from the TDCC. The cost for such

assistance would be completely dependent upon the extent of assistance required.

One potential political obstacle to the implementation of the EDI concept is the community-wide acceptance of this concept as the appropriate alternative. The high level support and commitment required does not presently exist. However, the need for improvement in the community today has become more apparent, and support for community-wide interface is growing, as evidenced by the money and effort invested in the TC ACCIS and TC DIS programs.

D. BENEFITS OF EDI

We fully accept that all of these concerns are valid and we realize that many of the issues must be resolved before any effort is made toward implementing the system interfaces proposed by TC ACCIS and by this thesis. Some of the questions raised are more within the political realm and must be solved by careful coordination with the agencies or organizations involved. Those types of issues are not being addressed here.

However, many of the supposed 'problems' would not be problems at all if the EDI standard interface system, as demonstrated in this thesis, was adopted as the technical solution to the actual data exchange portion of the TC ACCIS and TC DIS.

One of the major issues is the current requirement that existing service unique systems would have to be converted to be compatible with the JDS data element structure in order to effectively accomplish any interface. Using the proposed EDI system, there would be no need for the interface data bases to be maintained in identical format. All existing and potential systems could be designed according to individual service requirements. The EDI

interface programs automatically perform the conversions necessary to allow each system to interface with the standard data elements. This provides automatic interfacing between each system and JDS. An added benefit of the EDI conversion technique is that any system can also interface with any other system using the same conversion program. Thus it is easily possible for the three TOAs to have interfaces with each other as well as the proposed interface between the TOAs and JDS.

There would be some effort required initially to develop standard data sets for transfers unique to military requirements. However, the advantages of using EDI far outweigh the time and manpower required to establish these standard data sets. First, once the standard data sets are determined, new systems can be added and easily interfaced with the addition of only one new conversion program.

Second, the process of converting data files into the standard data sets automatically eliminates all but the essential information which must be transmitted. This would significantly reduce the amount of extraneous data being sent over already overloaded communications systems. In fact, use of the standard data sets should minimize use of the WIN, thus allowing it to be available for more interactive applications.

Finally, and most notably, the adoption of the EDI interface by the JDC would improve the overall effectiveness of the joint deployment process. Providing an automated interface enabling direct connection between all the participating agencies would ensure that the individual data bases at each agency are as much as possible in agreement with other agencies involved. Thus when an actual deployment must take place, all concerned parties will have ready access to current data which they require to accomplish their given mission.

E. SUMMARY

The necessity for continuous interaction between members of the joint deployment community is obvious. Current systems and interfaces are not providing the efficient and accurate data transfers required. Standardization is the solution most commonly proposed to alleviate the current situation. This proposal, however, has drawbacks which have been previously discussed.

The EDI concept - a table-driven electronic interface utilizing data elements, segments, and sets - is a proposed interface which would provide the necessary data transfer capabilities throughout the community. While there are many concerns about implementing this system, most of them are in the political realm, and are beyond the scope of this thesis. The technical feasibility of the EDI concept has been proven in use in several industries over the past few years. The application of this system to the military has been demonstrated in this thesis. Implementation within the joint deployment community would alleviate many of the current inadequacies and provide an advanced, efficient means of data transfer which would contribute to the professional performance of the joint deployment community.

APPENDIX A

DATA ELEMENT DICTIONARY

This appendix is a partial EDI Data Element Dictionary. The elements included here are used in the transaction set shown in Appendix B. These elements correspond to the data fields in a user site's data base.

19 CITY NAME
(Spec: Type = AN Min = 2; Max = 19)
Free-form text for city name

Reference Designator(s): D401 D701 D906 E401
E701 F401 F701 F906
G401 H502 L715 N401
NAM05 RT203 RT205 RIN04
S402 S903 T209 T210
T604 T607 2T03 U401
U901 V905 W304 W404
Y106

22 COMMODITY CODE
(Spec: Type = AN Min = 1; Max = 10)
Alpha/numeric code used to describe a commodity or group of commodities for rating and billing purposes.
Also see: COMMODITY CODE QUALIFIER (23)

Reference Designator(s): AC05 E607 GA07 L503
PR03 PR04 1R03 1R04
1R05 1R06 1R07 TD104
TF301 TF302 9T02 W203
W0111 W0411

23 COMMODITY CODE QUALIFIER
(Spec: Type = A Min = 1; Max = 1)
Qualifier for the commodity coding system used to define the item lading description (See Appendix A-A6 thru A13, A33)

CODE	DEFINITION
A	SCHEDULE A, tariff schedules of the United States annotated
B	U.S. foreign trade SCHEDULE B, statistical classification of domestic and foreign commodities exported form the United States
C	Canadian freight classification
E	coordinated motor freight classification
G	Canadian wheat board, grain code for terminal elevator accounting
H	Brussels nomenclature harmonized system (harmonized BTN)
I	MILSTAMP

L	last contained contents STCC
M	mutually defined
N	national motor freight classification (NMFC)
S	standard international trade classification (SITC)
T	standard transportation commodity code (STCC)
U	uniform freight classification (UFC)

Also see: COMMODITY CODE (22)

Reference Designator(s): GA01 L504 1R02 TD103 9T03 W0110 W0410

26 COUNTRY CODE

(Spec: Type = A Min = 2; Max = 2)

Two character ISC standard country code (See Appendix A-A5)

Reference Designator(s): B404 D704 D904 E404 ER001 F404 F704 F904 N404 NAM09 R405 R610 S405 S905 U404 U904 V907 X107k

65 HEIGHT

(Spec: Type = D2 Min = 1: Max = 6)

Vertical dimension of an object measured when the object is in the upright position.

Also see: LENGTH (82)
MEASUREMENT UNIT QUALIFIER (90)
WIDTH (189)
UNIT OF MEASUREMENT CODE (355)

Reference Designator(s): G3907 L403 P0415

66 IDENTIFICATION CODE QUALIFIER

(Spec: Type =AN Min = 1; Max = 2)

Type of identification code:

CODE	DEFINITION
1	DUNS
2	SCAC
3	FMC
4	IATA
5	SIRET
6	Mutually defined
7	DOCK
8	Vendor UPC code
9	DUNS with 4 digit suffix (UCS uses only CODE 9)
A	Automotive Industry Action Group(AIAG)

Reference Designator(s): A1101 A1203 A1205 C105 C202 C401 D102 D503 E102 F102 F503 F0108 F0806 F0911 N103 Q407 S103 S809 U102 U502

67 IDENTIFICATION CODE

(Spec: Type =AN Min = 2; Max =17)

DUNS, SCAC, FMC, SIRET, IATA, UPC, DUNS with

suffix, mutually defined or DOCK code (See Appendix A-A2, A16, A17, A18)
Note: UCS uses only DUNS with suffix.
Also see: IDENTIFICATION CODE QUALIFIER (66)

Reference Designator(s): A1102 A1204 A1206 C106 C203 C402 D103 D504 E103 F103 F504 F0109 F0602 F0603 F0807 F0912 N104 Q408 S104 S810 U103 U503

81 WEIGHT
(Spec: Type =N Min = 1; Max = 8)
Numeric Value of Weight
Also see: WEIGHT QUALIFIER (187)
WEIGHT UNIT QUALIFIER (188)
UNIT OF MEASUREMENT CODE (355)

Reference Designator(s): CTT03 F0401 F0404 G505 G0503 G2004 G3103 G3901 G7603 GD105 ISS03 L004 L301 L803 M803 M1105 N703 Q207 Q402 TD107 TD305 W0206 W0209 W0302 W1210 W1213 W2004 W2106 W2109 W2507 W2510 W2802 W7602

82 LENGTH
(Spec: Type =D2 Min = 1; Max =6)
Largest Horizontal Dimension of an Object measured when the object is in the upright position.
Also see: HEIGHT (65)
MEASUREMENT UNIT QUALIFIER (90)
WIDTH (189)
UNIT OF MEASUREMENT CODE (355)

Reference Designator(s): G3909 L401 P0413

93 NAME
(Spec: Type =AN Min = 1; Max = 35)
Free-form organization name or official title as it should appear for mailing address

Reference Designator(s): G303 G6102 N102 N201 N202 NAM02 S808 SCH05 ZT01 W6102

APPENDIX B

TRANSACTION SET #365

This appendix contains the transaction set, shown as it would be in the EDI Data Set documentation. This transaction set is required for the data transmission described in Chapter IV.

365 UNIT MOVEMENT DATA

ABSTRACT: This transaction set is used by the sender to transmit unit movement data to other joint deployment community members.

Segment	Require-ment	Max Use	Loop ID	Loop Index
ST	M	1	0	0
BGF	M	1	0	0

ST TRANSACTION SET HEADER

PURPOSE: To indicate the start of a transaction set and to assign a control number

ST	*	ST01 143 Transaction Set ID A01 M AN 03/03	*	ST02 329 Transaction Set Control Number M AN 04/09	NL

17 Characters maximum length

M 1 0 0

"A01" is a special process used in the EDI interface software to process the set ID, version, & functional ID.

BGF BEGINNING SEGMENT FOR FILE TRANSFER INFORMATION

PURPOSE: To transmit identifying numbers, dates, and other basic data relating to the transaction set.

BGF	*	BGF01 128 Reference No. Qual M AN 02/02	*	BGF02 127 Reference Number M AN 01/22	NL

31 Characters maximum length

M 1 0 0

	Requirement	Max Use	Loop ID	Loop Index

N1 NAME

PURPOSE: To identify a party by type of organization, name and code

N1	*	N101 98 Organization Identifier (M AN 01/22)	*	N102 93 Name (C AN 01/35)	*
	*	N103 66 ID Code Qualifier P0304 (C AN 01/02)	*	N104 67 ID Code P0304 (C AN 02/17)	NL

63 Characters maximum length

M 2 0 0

The type of organization to which the name is applied is specified by a two character code. The definition for data element 98 contains the code list.

When N103-N104 are not used, N102 (name) is required.

N2 ADDITIONAL NAME INFORMATION

PURPOSE: To specify additional names or those longer than 35 characters in length

N2	*	N201 93 Name (M AN 01/35)	*	N202 93 Name (O AN 01/35)	NL

75 Characters maximum length

O 2 0 0

This is a required segment if additional information is required to completely specify the name.

NOTE: N1 and N2 are required for the sending organization and for the receiving organization.

365 UNIT MOVEMENT DATA

Require-ment	Max Use	Loop ID	Loop Index

D1 UNIT IDENTIFICATION

PURPOSE: To specify unit identification code (UIC) and additional unit information

								Require-ment	Max Use	Loop ID	Loop Index
D1	*	D101 111 UIC M AN 06/06	*	D102 146 Type UMD M AN 01/01	*	D103 93 Name O AN 01/35	*	M	1	0	0

D104 19 City Name (Station) O AN 02/19	*	D105 156 State C A 02/02	*	D106 26 Country Code C A 02/02	NL	When D104 not used, D105-D106 not used

65 characters maximum length

D2 EQUIPMENT DETAILS

PURPOSE: To provide equipment information

								Require-ment	Max Use	Loop ID	Loop Index
D2	*	D201 122 Line Item Number M AN 06/06	*	D202 324 Load Number O AN 01/01	*	D203 532 Line Index Number M N 02/02	*	C	1000	0	0

D204 24 Model Number O AN 01/12	*	D205 64 Water Commodity Code O AN 05/05	*	D206 216 Type Packing O A 02/02	*	Note: Mandatory when code in segment N101 is JD (=Joint Deployment Agency); optional otherwise

Element	Ref.	Name	Attributes
D207	91	Mode	M A 01/01

N/L

29 characters maximum length

D3 EQUIPMENT MEASUREMENT

PURPOSE: To describe physical dimensions

D3 * ... C 1000 0 0

Element	Ref.	Name	Attributes
D301	372	Item Description	M AN 01/02
D302	82	Length	C N 01/06
D303	189	Width	C D2 01/06
D304	65	Height	C D2 01/06
D305	90	Measurement Unit Qualifier	C A 01/01
D306	81	Weight	M N 01/08
D307	188	Weight Unit Qualifier	M A 01/01
D308	183	Volume	M N 01/08
D309	184	Volume Unit Qualifier	M A 01/01

N/L

Note: This data segment required if code in segment N101 is JD; optional otherwise

58 characters maximum length

365 UNIT MOVEMENT DATA

	Require-ment	Max Use	Loop ID	Loop Index

D4 CARGO INFORMATION

PURPOSE: To provide cargo information

		D401 413		D402 414	
D4	*	Cargo Category Code	*	Heavy Lift Code	N L
		M AN 03/03		M AN 01/01	

04 characters maximum length

C 1 0 0

Note: This data segment is required if code in segment N101 is JD (=Joint Deployment Agency); optional for others

K4 COMMENTS

PURPOSE: To transmit information in a free-form format, if necessary, for comment or special instruction

	K401 638	
K4	Comments	N L
	M AN 01/80	

84 characters maximum length

C 1 0 0

SE TRANSACTION SET TRAILER

PURPOSE: To indicate the end of the transaction set and provide the count of the transmitted segments (including the beginning and ending (SE) segment)

		SE01 96		SE02 329	
SE	*	Number of incl seg A16	*	Trans set Control no. A17	N L
		M AN 01/06		M AN 04/09	

04 characters maximum length

C 1 0 0

The control number is the same as that used in the corresponding header.

Note: "A16" and "A17" are process identifiers in the EDI edit tables which are used to construct or check the data elements in the "SE" segment.

APPENDIX C

AUTOMATED UNIT EQUIPMENT LISTINGS (AUELS)

This appendix contains Automated Unit Equipment Listings. The data in these listings was used in the demonstration of the EDI concept, as described in Chapter IV. It should be noted that, although these two listings contain data from different units (Ft. Meade and Ft. Ord), the data from both was transmitted in one transaction set as shown in Figure 4.3.

UPDATED 05 NOV 86 CHEZ4 UNCLASSIFIED RCN 04LSA RCS AFLG-165(R1)

HEADQUARTERS UNITED STATES ARMY FORCES COMMAND (FORSCOM)

* * * COMPUTERIZED MOVEMENT PLANNING AND STATUS SYSTEM (COMPASS) * * *

COMPASS REPORT - UNIT EQUIPMENT LIST

UIC WHGWAA TYPE DATA R UNIT NAME 0203 MP CO STATION FT MEADE STATE MD SAC OFFICE CODE BAAT

SHIPMENT UNIT NUMBER	C H	LIN	IND	SHIPMENT UNIT DESCRIPTION	MODEL	DIMENSIONS (INCHES) LGTH	WDTH	HGTH	SQ FT	CU FT	ITEM WT LBS	PLANNED LOADED WT LBS	ACTUAL LOADED WT LBS	PK	COMM CODE	H E	CSC CAT	STON	MTON
002015		W95400	01	TRAILER CARGO 1/4 TON M416		107	62	44	47	170	580	1080		VE	87529	U	0V9	.5	5
		(A)		LOAD -MISC TOE ORG EQUIP		PCS=	10			30	500			MX					
002017		W95400	01	TRAILER CARGO 1/4 TON M416		109	62	44	47	170	580	1080		VE	87529	U	0V9	.5	5
		(A)		LOAD -MISC TOE ORG EQUIP		PCS=	10			17	500			MX					
002019		W95400	01	TRAILER CARGO 1/4 TON M416		109	62	44	47	170	580	1080		VE	87529	U	0V9	.5	5
		(A)		LOAD -MISC TOE ORG EQUIP		PCS=	10			50	500			MX					
003001		X40009	02	TRUCK CARGO 2-1/2 TON M35A2		265	95	95	175	1722	13130	18000		VO	87529	U	0V9	9.0	33
		(A)		LOAD -MISC TOE ORG EQUIP		PCS=	10			270	4820			MX					
004001		X40146	02	TRUCK CARGO 2-1/2 TON M35A2 WWN		273	95	84	185	1950	13570	18390		VO	87529	U	0V9	9.2	36
		(A)		LOAD -MISC TOE ORG EQUIP		PCS=	10			270	4420			MX					
005001		W95811	02	TRAILER CARGO 1-1/2 T M105A2		165	83	97	95	554	2670	5600		VE	87529	U	0V9	2.3	17
		(A)		LOAD -MISC TOE ORG EQUIP		PCS=	10			200	2930			MX					
005002		W95811	02	TRAILER CARGO 1-1/2 T M105A2		166	83	97	94	554	2670	5600		VE	87529	U	0V9	2.3	17
		(A)		LOAD -MISC TOE ORG EQUIP		PCS=	10			230	2930			MX					

23 APR 84 CHJMC UNCLASSIFIED PCN 04LSA RCS AFLG-165(R1)

HEADQUARTERS UNITED STATES ARMY FORCES COMMAND (FORSCOM)

* * * COMPUTERIZED MOVEMENT PLANNING AND STATUS SYSTEM (COMPASS) * * *

COMPASS REPORT - UNIT EQUIPMENT LIST

UIC [redacted] TYPE DATA D UNIT NAME 0051 AD BN 01 BTY A VULC STATION FT ORD STATE CA GBL OFFICE CODE LHAT

SHIPMT UNIT NUMBER	E C M	LIN	IND	SHIPMENT UNIT DESCRIPTION	MODEL	DIMENSIONS (INCHES) LGTH	WDTH	HGTH	SQ FT	CU FT	ITEM WT LBS	PLANNED LOADED WT LBS	ACTUAL LOADED WT LBS	TP PK	COMM CODE	P E	CGO CAT	STON	MTON
001001		X60833	02	TRUCK UTILITY 1/4 TON	M151A2	132	64	53	59	256	2450			VO	87529	U	OVR	1.2	7
002001		W95400	01	TRAILER CARGO 1/4 TON	M416	109	62	44	47	170	580	~~EMPTY~~		VE	87529	U	OVR	.3	5
003001		X60833	02	TRUCK UTILITY 1/4 TON	M151A2	132	64	53	59	256	2450			VO	87529	U	OVR	1.2	7
004001		W95400	01	TRAILER CARGO 1/4 TON	M416	109	62	44	47	170	580	~~EMPTY~~		VE	87529	U	OVR	.3	5
005001		X60833	02	TRUCK UTILITY 1/4 TON	M151A2	132	64	53	59	256	2450			VO	87529	U	OVR	1.2	7
006001		W95400	01	TRAILER CARGO 1/4 TON	M416	109	62	44	47	170	580	~~EMPTY~~		VE	87529	U	OVR	.3	5
007001		X60833	02	TRUCK UTILITY 1/4 TON	M151A2	132	64	53	59	256	2450			VO	87529	U	OVR	1.2	7
006001		W95400	01	TRAILER CARGO 1/4 TON	M416	109	62	44	47	170	580	~~EMPTY~~		VE	87529	U	OVR	.3	5
009001		X60833	02	TRUCK UTILITY 1/4 TON	M151A2	132	64	53	59	256	2450			VO	87529	U	OVR	1.2	7
010001		W95400	01	TRAILER CARGO 1/4 TON	M416	109	62	44	47	170	580	~~EMPTY~~		VE	87529	U	OVR	.3	5
011001		X60833	02	TRUCK UTILITY 1/4 TON	M151A2	132	64	53	59	256	2450			VO	87529	U	OVR	1.2	7
012001		W95400	01	TRAILER CARGO 1/4 TON	M416	109	62	44	47	170	580	EMPTY		VE	87529	U	OVR	.3	5
013001		X60833	02	TRUCK UTILITY 1/4 TON	M151A2	132	64	53	59	256	2450			VO	87529	U	OVR	1.2	7
014001		W95400	01	TRAILER CARGO 1/4 TON	M416	109	62	44	47	170	580	EMPTY		VE	87529	U	OVR	.3	5
015001		X39940	02	TRUCK CARGO 1-1/4 TON	M561 WWN	231	85	72	137	820	7480	EMPTY		VO	87529	U	OVR	3.7	21
016001		J96845	02	GUN AA TOWED 20MM	M167	158	78	66	86	467	3260			VE	87529	U	OVR	1.6	12
017001		X39940	02	TRUCK CARGO 1-1/4 TON	M561 WWN	231	85	72	137	820	7460	EMPTY		VO	87529	U	OVR	3.7	[illegible]
018001		J96845	02	GUN AA TOWED 20MM	[illegible]	[illegible]	[illegible]												

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